June 21, 2004

Request for Proposal
System Integrator for
CCTV System Upgrade and Deployment Testing

Letter of Invitation

Dear Contractor:

The Metropolitan Transportation Commission Service Authority for Freeways and Expressways ("MTC SAFE") invites your firm to submit a proposal to act as System Integrator to manage the upgrade of the Caltrans District 4 Closed Circuit Television (CCTV) system. The project includes the design, development, integration, deployment, and testing of the system, including software, hardware and associated field equipment and the implementation of a prototype throughout District 4, if full implementation is authorized by the MTC SAFE. The System Integrator will be expected to accomplish the project in two phases:

- Phase I, Part A, "Prototype Design and Lab Demonstration": Design, develop, furnish, and demonstrate a cost effective Internet Protocol (IP)-based CCTV system, including video and control servers, encoders/decoders, telecommunications & network equipment, all associated software, including the Graphical User Interface (GUI) and any other equipment necessary to ensure that the CCTV Prototype system meets the Request for Proposal ("RFP") specifications.
- Phase I, Part B, "Prototype Field Integration": Contingent on the successful completion of Part A, install, integrate, deploy, test and demonstrate full operability of the prototype CCTV system and GUI, providing seamless access to 20 existing camera locations with various combinations of existing and new equipment.
- Phase I, Part C, "Full Prototype Interoperability With All Field CCTVs": Contingent on the successful completion of Part B, install, integrate, deploy, test and demonstrate full operability of the prototype CCTV system and GUI, providing seamless access to all (approximately 400) existing camera locations with new and legacy system components.
- Phase I. Part D, " Phase II Deployment Plan": Contingent on the successful completion of Part C, System Integrator shall develop a detailed Deployment Plan for the full District-wide build out of the new IP-based CCTV system components deployed in Phase I, including a schedule for completion of Phase II work. The Plan shall include a full integration of the Phase I CCTV system to the Caltrans District 4 Advanced Transportation Management System (ATMS).

JOSEPH P. BORT METROCENTER, 101 EIGHTH STREET, OAKLAND, CA 94607-4700
Tel.: 510.464.7700 • TTY/TDD: 510.464.7769 • Fax: 510.464.7848 • e-mail: info@mtc.ca.gov

- Phase II, "Full Deployment of the IP-based Prototype System." This Phase represents full integration of the Phase I CCTV System into the Caltrans District 4 ATMS. Contingent upon the decision by MTC SAFE to fully deploy the Prototype, the System Integrator will migrate all encoders at the camera locations as well as the associated Traffic Management Center (TMC) equipment to the IP-based system. The System Integrator will upgrade or replace, and then activate approximately 380 video camera locations using the P-based communications approach deployed in Phase I.

Due to the complexity of the project and the diverse areas of expertise required, MTC SAFE anticipates that a team approach will be necessary.

This letter, together with its enclosures, comprises the Request for Proposal (RFP) for this project. Responses to the RFP should be submitted according to the instructions outlined herein.

This letter will be distributed, at a minimum, to all firms that responded to the Industry Review Draft RFP issued on February 4th, 2004. The entire RFP, including *Appendix H*, Contract Terms and Conditions, may be obtained from the MTC website at http://www.mtc.ca.gov/about_mtc/doing_biz/doingbiz.htm .

Proposal Due Date

Interested firms must submit six hard copies of their proposal, by 4:00 p.m. on **Wednesday, August 11, 2004**. ***Proposals received after that date and time will not be considered.*** Proposals will be considered firm offers to enter into a contract and perform the work described in this RFP for a period of 120 days.

MTC SAFE Point of Contact

Proposals and all inquiries relating to this RFP shall be submitted to the Contract Manager at the address shown below. For telephone inquiries, call (510) 817-3230. E-mail inquiries may be directed to twells@ mtc.ca.gov

Tom Wells, Contract Manager
Metropolitan Transportation Commission
Joseph P. Bort MetroCenter
101 Eighth Street
Oakland, California 94607-4700
Fax: (510) 817-3299

Background

The Metropolitan Transportation Commission Service Authority for Freeways and Expressways (SAFE) provides roadside assistance to motorists on the Bay Area Freeways,

pursuant to California Streets and Highways Sections 2550 *et seq*. Its revenues are derived from a one-dollar vehicle registration fee collected by the State of California from the nine Bay Area Counties. The funds are used to finance maintenance and operation of the Bay Area call box program that provides roadside assistance to stranded motorists. Funds are also distributed to other motorist aid programs such as the CCTV Upgrade project.

MTC SAFE has teamed up with the California Department of Transportation (Caltrans) District 4, and the California Highway Patrol (CHP) to manage this project. The project manager serves as the technical manager for the project and will be a member of the Caltrans District 4 staff. . MTC SAFE hired the consulting firm of Kimley-Horn and Associates to evaluate the feasibility of upgrading the CCTV system, to present and recommend options to the partner agencies for an upgrade, and to identify a cost effective approach around which consensus could be reached. The scope of work (*Appendix A*) is the result of this process and represents the consensus of the partner agencies.

While Phase I (developing and implementing a prototype IP-based CCTV system) is the focus of this RFP, MTC SAFE is also interested in using this prototype project as the foundation for Phase II work items. Phase II will include deploying a full system upgrade involving all 400 camera locations in the Caltrans District 4 system and integration of the ATMS, if Phase I is deemed by MTC SAFE and its partners to be successful.

MTC SAFE has selected a System Integrator approach for this project in order to achieve the following objectives:

1. Provide technical expertise in IP-based software and hardware development and system integration;
2. Provide technical and management expertise necessary to deploy and implement a prototype system that satisfies identified system requirements;
3. Provide implementation support; and
4. Provide strategic guidance for future development.

MTC SAFE expects the System Integrator to be fully responsible for carrying out all phases of this project, including team selection, oversight, quality control, etc. Further detail is contained in the enclosed RFP.

Proposer Qualifications

Proposals demonstrating the following minimum qualifications will be evaluated by the selection panel:

- Demonstrated prime consultant experience in project management of large software development projects;
- Demonstrated prime consultant experience in successfully implementing cost controls and timely delivery of work products, as substantiated by prior similar projects delivered on time and within budget.

- Demonstrated team experience in the testing, integration and deployment of CCTV systems, video streaming and management, video sharing, roadway video applications, digital encoders/decoders;
- Demonstrated team experience in software system design and platform integration;
- Demonstrated team experience in traffic monitoring and management technologies; and
- Demonstrated experience in effectively providing system technical support in a timely manner.

In addition to these minimum qualifications, familiarity with or expertise in the following areas is desirable and will be considered in evaluating the experience of the proposals:

- Prime consultant experience in public sector procurement and project management;
- Examples of successful development and deployment of complex video display and control systems in which Proposer acted as the primary contractor.

Scope of Work, Schedule and Budget

A scope of work and functional requirements for Phase I of the Project is provided in *Appendix A*, Scope of Work. *Appendix B* contains the Phase I equipment list, and the Phase II general scope of work is in *Appendix C*.

MTC SAFE intends to award a contract covering both Phases I and II. The contract the selected contractor will be expected to sign is included in the RFP as *Appendix H*, Contract Terms and Conditions. The contract will be deliverables-based, and payment for work will be contingent upon timely and successful completion of each task identified in the scope of work. Phase I is not expected to take more than 12 months, and initiation of Phase II will depend on the successful completion of Phase I. The final project schedule will be based on the selected Contractor's proposal, but the most reasonable, accelerated schedule is desired.

MTC SAFE has not established a fixed budget for the overall project or individual phases, although we believe adequate funds are available to fund the entire effort. Our estimate for the work to be performed in Phase I is $1,000,000. Proposers are invited to submit their most cost-effective proposal for Phase I and a reasonable estimate of the cost of Phase II, based on current information. . At the end of Phase I, if MTC SAFE determines to proceed with Phase II, we will negotiate a Contract Price for Phase II based on the proposed budget for Phase II submitted with the System Integrator's Proposal and the results of Phase I, Task 9, in which a detailed scope of work, schedule and budget for Phase II will be developed.

Performance and Payment Guaranties

Prior to contract execution, BATA will require a Performance Bond and a Payment Bond, issued by surety acceptable to BATA. The Performance Bond shall be in the amount of 100% of the Contract Price for Phase I, and the Payment Bond shall be in the amount of 100% of the amount to be paid to the subcontractors under Phase I. In lieu of a Performance Bond, a

Proposer may provide MTC SAFE with an irrevocable Letter of Credit to secure the Contractor's obligations under Phase I of the Contract, in the amount of $1,000,000. See *Appendix H*, Contract Terms and Conditions, for details. MTC SAFE reserves the right to require performance and payment bonds in comparable percentage amounts for Phase II, as well.

Proposers' Conference and Requests for Exceptions or Revisions

A Proposers' Conference will be held on July 9, 2004, on the 17th Floor of the Lake Merritt Plaza, Claremont Conference Room, at 1999 Harrison Street, Oakland. To receive any addenda to this RFP or written responses to questions that may be issued by MTC SAFE, proposers must attend the Proposers' Conference or provide written notice to MTC SAFE no later than the date of the Proposers' Conference of their interest in submitting a proposal.

Any requests for clarification of or exceptions or revisions to RFP requirements or MTC SAFE's contract language must be received by MTC SAFE no later than July 16, 2004. Proposers are requested to submit both questions and requests for exceptions or revisions electronically on the forms included in this RFP for that purpose, *Appendices J-1* and *J-2*.

Conflict of Interest

MTC SAFE recognizes that some prospective System Integrators interested in responding to this RFP may also be interested in providing the camera management software system or technology required by MTC SAFE. MTC SAFE has determined that it will accept proposals from firms interested in providing the camera management software system or technology required under the Project under the following condition:

> In order to ensure comprehensive, impartial analysis and recommendations for the encoder/decoder hardware and software that may be proposed for this project, Phase I, Part A, Task 2 – Video Encoder/Decoder Pre-evaluation Test Bed deliverables cannot be supplied by a provider or distributor of video encoder/decoder software applications or hardware manufacturer.

Therefore, where a manufacturer of encoder/decoder hardware/software submits a proposal as prime contractor (System Integrator) for this project, such prime proposer shall be required to subcontract with an independent vendor to conduct all aspects of Phase I.A, Task 2, and shall identify the proposed subcontractor in its proposal to MTC SAFE. The subcontractor cannot be affiliated with or otherwise have a financial interest in the prime contractor. The manufacturer of encoder/decoder hardware/software must provide references for the subcontractor in addition to their own. Clarifications of this requirement will be provided on a case-by-case basis.

In addition, in order to ensure that this Project makes use of the best available technologies, software, hardware, and integration services, the System Integrator (Prime Contractor) shall

not enter into exclusive teaming arrangements that limit other potential proposer's ability to obtain equal access to technologies, software, hardware, and integration services that may be needed for preparing cost proposals or providing equipment/services for this project.

Proposal Evaluation

Proposals meeting the minimum qualifications will be evaluated in accordance with the evaluation factors listed in *Section VI* of the RFP. MTC SAFE reserves the right to accept or reject any or all proposals submitted, waive minor irregularities in proposals, request additional information or revisions to offers, and to negotiate with any or all proposers. Any contract award will be to the firm that presents the proposal that, in the opinion of MTC SAFE, is the most advantageous to MTC SAFE, based on the evaluation criteria specified in *Section VI.*

System Integrator Selection Timetable

July 9, 2004 @ 2:00pm	Proposers' Conference in Lake Merritt Plaza, 17th Floor, Claremont Conference Room at 1999 Harrison Street, Oakland.
July 14, 2004	Closing date/time for receipt of requests for clarification/exceptions
July 28 @ 4:00 pm	**Closing date/time for receipt of proposals**
August 11, 2004	Discussions (if required)
August 25, 2004	Best and Final Offer (if required)
September 10, 2004	MTC SAFE Committee Review
September 17, 2004 (approximate)	Execute Contract

General Conditions

All materials submitted by proposers are subject to public inspection under the California Public Records Act (Government Code § 6250 *et seq*.), unless exempt. (See *Section VII.G* of RFP).

Appendix H, Contract Terms and Conditions, along with the technical and functional requirements for this project, as described in *Appendices A* and *C*, and the selected Proposal will constitute the contract for the project. Please note that, if selected as System Integrator, the Contractor will be required to obtain and maintain at its own expense the following types of insurance for the duration of this agreement: (1) Worker's Compensation Insurance, as required by the laws of California, and Employer's Liability Insurance in an amount no less than $1,000,000; (2) Commercial General Liability Insurance with a combined single limit of not less than $1,000,000 for injury to any one person and for any one occurrence, with a $2,000,000 general Trip aggregate; (3) Automobile Liability Insurance in an amount no less

not less than $1,000,000 for injury to any one person and for any one occurrence, with a $2,000,000 general Trip aggregate; (3) Automobile Liability Insurance in an amount no less than $1,000,000; and (4) Professional Liability Insurance in the amount of $1,000,000. The Commercial General Liability Insurance policy will include an endorsement adding MTC SAFE, Caltrans, and their directors, Commissioners, officers, representatives, agents and employees as additional insureds. Also, the policies must specify that such insurance is primary and that no MTC SAFE or Caltrans insurance will be called on to contribute to a loss.

Authority to Commit MTC SAFE

Based on the recommendation of a selection panel, the Executive Director of MTC will recommend a Contractor to the SAFE Operations Committee, which will commit MTC SAFE to the expenditure of funds in connection with this RFP.

Thank you for your participation.

Sincerely,

Ann Flemer

Ann Flemer
Deputy Director, Operations

This page left blank intentionally

REQUEST FOR PROPOSALS

To The

METROPOLITAN TRANSPORTATION COMMISSION

For

CCTV SYSTEM UPGRADE

And

DEPLOYMENT TESTING PROJECT

June 21, 2004

Joseph P. Bort MetroCenter
101 Eighth Street
Oakland, CA 94607-4700

This page left blank intentionally

TABLE OF CONTENTS

I. BACKGROUND & PROJECT DESCRIPTION

A. Background

Since the early 1990's, Caltrans has operated and maintained video cameras on Bay Area freeways for incident verification and response. The evolution of the video system design and architecture was primarily driven by the video technology at that time and the district's telecommunications infrastructure limitations, mainly leased circuits. Therefore, the Traffic Management Center (TMC) video control and monitoring systems have evolved with very little scalability and video sharing capabilities and do not satisfy today's demands and requirements for sharing and distribution. Furthermore, much of the encoding video equipment has exceeded its life cycle and is in need of an upgrade.

The existing video system consists of different software and hardware components both in the field and TMC. Hardware components such as closed circuit television (CCTV) cameras, pan-tilt-zoom and communications devices and video encoders are installed at strategic locations to monitor freeway traffic incidents. Analog video from the CCTV cameras are digitized, compressed, encoded and transported to the TMC via 56K Advanced Digital Network (ADN) circuits or dial-up 112K Integrated Services Digital Network (ISDN) Lines. At the TMC, the operator selects the desired video signal with a COHU camera control panel (legacy system) or by the [spell out] (DTS) workstation (ISDN system). The video is then decoded, decompressed and converted to analog video for display at the operator's workstation.

The earliest CCTV system to be deployed was designed and built in-house based on leased ADN circuits. At its peak, there were about 90 ADN cameras. Because of the obsolescence of the codec and central switching equipment, Caltrans is gradually replacing many of these with ISDN cameras. However, in order to be accessed by an operator, ISDN cameras must be dialed up and the camera latency is slow. ISDN cameras are also costly to operate.

During the period spanning the 90's through 2002, Caltrans went through a series of CCTV system changes involving the introduction of video camera control software, the replacement of some video encoders/decoders and the introduction of new cameras culminating in the opening of the District 4 TMC. At its peak, District 4 had deployed approximately 400 video cameras. These include ADN, ISDN and a small number of wireless and fiber cameras. A new video wall and map were introduced along with many new workstations for viewing the cameras, but the distinct CCTV subsystems were never integrated.

There is no single graphical user interface (GUI) from which all cameras can be accessed. The operator is required to access different system cameras via the use of several different user interfaces.

After conducting their initial assessment of the existing CCTV system at Caltrans District 4, our consultants, Kimley-Horn & Associates, determined that the ITMS analog based system currently in use for camera control and management would over time, be more difficult and more costly to maintain or upgrade. A project goal is to demonstrate a prototype Internet-Protocol (IP)-based system in which video can be transmitted and exchanged reliably among multiple locations in near real-time.

B. Project Objectives

The objective of this project is to deliver a CCTV system upgrade that:

1. Provides accurate, real-time, reliable, stable and user-friendly access for all TMC users (Caltrans, CHP & TravInfo®) to all of District 4's CCTV cameras and video using a single user interface,

2. Converts the current analog camera management and control system to a state-of-the-art IP- based system,

3. Ensures that the new IP-based system is fully interoperable with all existing Caltrans cameras, and

4. Provides system enhancements such as an " automated camera health monitoring system" and an IP-based video sharing with limited access for transportation responders to major incidents.

C. System Integrator Approach

MTC SAFE has selected a System Integrator approach for this project in order to achieve the following objectives:

1. Provide technical expertise in IP-based software and hardware development and system integration;
2. Provide technical and management expertise necessary to deploy and implement a prototype system that satisfies identified system requirements;
3. Provide implementation support;
4. Provide strategic guidance for future development.

The CCTV System Upgrade System Integrator will have the overall responsibility for developing and implementing the CCTV System Upgrade Project. This includes:

1. Purchasing and timely delivery of all software and hardware as required in the scope of work;
2. Guaranteeing the quality and durability of all software and hardware purchases;
3. Guaranteeing the workmanship to be of the highest quality during all phases of the project;
4. Ensuring the timely development, installation and the successful testing of the prototype CCTV system upgrade.

D. TMC Access

In order to promote equitable competition during the procurement process, upon written request, any proposer on this contract shall be provided a tour of the Caltrans District 4 Traffic Management Center (TMC) in Oakland California. The Contract Manager will be the initial point of contact for proposers interested in a tour, all such tours of these facilities shall be coordinated exclusively with the Project Manager.

E. Other Resources

The following information is available to proposers in the MTC /Association of Bay Area Governments library (510-464-7836), in the Joseph P. Bort MetroCenter, 101 Eighth Street Oakland, CA 94607-4700:

1. Freeway Concept Of Operations Communications and Implementation Master Plan:
   http://www.bayareatrafficsignals.org/downloads/FwyConOps/CommunicationsMasterPlan.pdf

2. Transportation Management Systems Standardization Plan 2002
   or at Caltrans: http://caltrans-opac.ca.gov/publicat.htm

3. MTC Annual Report 2000
   http://www.MTC.ca.gov/publications/AnnualReport-00/arindex.htm

4. "Citizens Guide to the Metropolitan Transportation Commission: Basics on the Bay Area's Transportation Planning, Financing and Coordinating Agency" (Nov. 2000)
   http://www.MTC.ca.gov/publications/citizens_guide/cgindex.htm

In addition, see:

- Caltrans District 4 Real Time Traffic

  http://www.dot.ca.gov/dist4/realtime.htm

- Welcome To Caltrans District 4

  http://www.dot.ca.gov/dist4

- California Highway Patrol (CHP)

  http://www.chp.ca.gov

II. SCOPE OF WORK AND BUDGET

The detailed preliminary scope of work for Phase I of the project is provided in *Appendix A*, Scope of Work. A more generalized scope of work for Phase II appears in *Appendix C*. The System Integrator will be expected to perform all work and analysis necessary to complete the final approved work scopes for Phases I and II, resulting from Phase I, Part

A, Task 1, and Part D, Task 9, consistent with the functional and technical requirements in *Appendix A*. In summary, the tasks to be carried out by the System Integrator will be performed utilizing a phased approach. These phases are:

- **Phase I. Part A – Prototype Design and Lab Demonstration**
  Design, develop, furnish, and demonstrate a cost effective IP-based CCTV system, including video and control servers, encoders/decoders, telecommunications & network equipment, all associated software, including the Graphical User Interface (GUI) and any other equipment necessary to ensure that the CCTV Prototype system meets the RFP specifications.

- **Phase I. Part B – Prototype Field Integration**
  Contingent on the successful completion of Phase I. Part A, install, integrate, deploy, test and demonstrate full operability of the prototype CCTV system and GUI, providing seamless access to 20 existing camera locations using various combinations of existing and new equipment.

- **Phase I. Part C – Full Prototype Integration and Interoperability**
  Contingent on the successful completion of Part B, install, integrate, deploy, test and demonstrate full operability of the prototype CCTV system and GUI, providing seamless access to all approximately 400 new and legacy cameras.

- **Phase I. Part D – Develop A Phase II Deployment Plan** Contingent on the successful completion of Part C, System Integrator shall develop a detailed Deployment Plan for the full District-wide build out of the CCTV system deployed in Phase I, including a schedule for completion of Phase II work. The Plan shall include a full integration of the Phase I CCTV system to the Caltrans District 4 ATMS.
- **Phase II**, "Full Deployment." This Phase represents full integration of the Phase I CCTV System into the Caltrans District 4 ATMS. Contingent upon the decision by MTC SAFE to fully deploy the Prototype, the System Integrator will migrate all encoders and associated field and TMC equipment to the IP-based system and upgrade or replace and activate approximately 380 video camera locations using the IP-based communications approach deployed in Phase I.

MTC SAFE intends to award a contract covering both Phases I and II. The contract will be deliverables-based, and payment for work will be contingent upon timely and successful completion of each task identified in the scope of work. Phase I is not expected to take more than 12 months, with the exception of Task 8 (an Operational Support period of three years), and initiation of Phase II will depend on the successful completion of Phase I. The final project schedule will be based on the selected Contractor's proposal, but the most reasonable, accelerated schedule is desired.

MTC SAFE has not established a fixed budget for the overall project or individual phases, although we believe adequate funds are available to fund the entire effort. Our estimate for the work to be performed in Phase I is $1,000,000. Proposers are invited to submit their most cost-effective proposal for Phase I and a reasonable estimate of the cost of Phase II, based on current information. At the end of Phase I, if we determine to proceed with Phase II, we will negotiate a Contract Price for Phase II based on the System Integrator's proposed budget for Phase II, submitted with its Proposal, and the results of Phase I, Task 9, in which a detailed scope of work, schedule and budget for Phase II will be developed.

III. CONFLICT OF INTEREST

MTC SAFE recognizes that some prospective System Integrators interested in responding to this RFP may also be interested in providing the camera management software system or technology required by MTC SAFE. MTC SAFE has determined that it will accept proposals from firms interested in providing the camera management software system or technology required under the Project under the following condition:

In order to ensure comprehensive, impartial analysis and recommendations for the encoder/decoder hardware and software that may be proposed for this project, Phase I, Part A, Task 2 – Video Encoder/Decoder Pre-evaluation Test Bed deliverables cannot be supplied by a provider or distributor of video encoder/decoder software applications or hardware manufacturer.

Therefore, where a manufacturer of encoder/decoder hardware/software submits a proposal as prime contractor (System Integrator) for this project, such prime proposer shall be required to subcontract with an independent vendor to conduct all aspects of Phase I.A, Task 2, and shall identify the proposed subcontractor in its proposal to MTC SAFE. The subcontractor cannot be affiliated with or otherwise have a financial interest in the prime contractor. The manufacturer of encoder/decoder hardware/software must provide references for the subcontractor in addition to their own. Clarifications of this requirement will be provided on a case-by-case basis.

In addition, in order to ensure that this Project makes use of the best available technologies, software, hardware, and integration services, the System Integrator (Prime Contractor) shall not enter into exclusive teaming arrangements that limit other potential proposer's ability to obtain equal access to technologies, software, hardware, and integration services that may be needed for preparing cost proposals or providing equipment/services for this project.

IV. MINIMUM QUALIFICATIONS

Proposals demonstrating the following minimum qualifications will be evaluated by the selection panel.

- Demonstrated prime consultant experience in project management of large software development projects;
- Demonstrated prime consultant experience in successfully implementing cost controls and timely delivery of work products, as substantiated by prior similar projects delivered on time and within budget.
- Demonstrated team experience in the testing, integration and deployment of CCTV systems, video streaming and management, video sharing, roadway video applications, digital encoders/decoders;
- Demonstrated team experience in software system design and platform integration;
- Demonstrated team experience in traffic monitoring and management technologies; and
- Demonstrated team experience effectively providing system technical support in a timely manner.

In addition to these minimum qualifications, familiarity with or expertise in the following areas is desirable and will be considered in evaluating the experience of the proposals:

- Prime Consultant experience with public sector procurement and project management;
- Examples of successful development and deployment of complex video display and control systems in which Proposer acted as the primary contractor.

V. FORM OF PROPOSAL

Proposers must submit six copies of their proposal, by **4:00 pm on Wednesday, July 28, 2004** to be considered.

Proposal content and completeness are most important. Although no page limitation will be imposed, clarity is essential and will be considered in assessing the proposers' capabilities. Each proposal should include:

A. Transmittal Letter

A transmittal letter signed by an official authorized to solicit business and enter into contracts for the firm and the name and telephone number of a contact person, if different from the signator.

B. Title Page

The title page should show the RFP subject, the name of the proposer’s firm, local address, telephone number, name of contact person, and the date.

C. Table of Contents

The table of contents should include a clear identification of the material by section and page number.

D. Summary and Approach to Performing the Project

This section should clearly convey the Contractor's understanding of the nature of the work and the general approach to be taken. It should include, but not be limited to, the following:

1. A brief summary of the purpose of the project;
2. A discussion of proposed approach to Phase I, and the assumptions made in selecting this approach; and
3. A discussion of the proposed approach to Phase II, and the assumptions made in selecting the approach.

The proposal approach should specifically address how the CCTV System Integrator will manage the overall project. Software project management techniques that need consideration include, but are not limited to:

- Design flexibility for progressive needs.
- Risk management
- End user and stakeholder iterative involvement.
- Planning a schedule into manageable and achievable steps.
- Identifying scheduling and programming dependencies.
- Aggressive quality assurance testing for real-world situations and users.
- Documentation to ensure flexible administration.
- Configuration management system

This section of the proposal should comment or elaborate on these ideas in enough detail with respect to each Phase to communicate to MTC SAFE the proposer's understanding of the work involved, as well as of the dynamics of software integration projects.

This section should also address the provider of camera management software system or technology, as described in Section V.E below.

E. Conflict of Interest Statement

This section should consist of a statement that fully describes the manner in which the proposal will comply with the Conflict of Interest requirement in Section III, including a statement(s) indicating whether the prospective System Integrator is proposing to provide the camera management software system or technology required by MTC SAFE or to subcontract with a vendor.

If the prospective System Integrator is <u>not</u> proposing to provide the camera management software system or technology, Section V.D of the proposal (above) must identify the

recommended manufacturer(s) of the software system or technology considered to be appropriate for this project including company and product names. A detailed justification for recommending such manufacturer(s) over others should be included in Section V.D.

If, however, the prospective System Integrator is proposing to provide the camera management software system or technology, Section V.D of the Proposal (above) must name the independent vendor with which it proposes to subcontract to conduct all aspects of Phase I.A, Task 2. The prime proposer shall affirm that said subcontractor is neither affiliated with, nor otherwise holding of a financial interest in the prime contractor. A detailed justification for selecting the named vendor to perform Phase I.A, Task 2 should be included in Section V.D.

F. Detailed Work Plan

1. Discuss how the Contractor will conduct each task of the project identified in *Appendix A*, identify deliverables, and propose a preliminary schedule. The description of the proposed approach to performing the project should fully discuss the tasks in sufficient detail to demonstrate a clear understanding of the project and approach to coordinating with MTC SAFE staff. The schedule should show the expected sequence of tasks, subtasks, and important milestones. The selected Contractor, in consultation with MTC SAFE staff, will develop a final work plan and schedule.
2. Discuss the techniques and processes used, whether formal or informal, that will ensure development and implementation of a quality product and minimize risk of project failure.
3. Provide a detailed staffing plan for each task and subtask of the work. Identify all staff by name and the specific tasks for which each individual will be responsible.
4. Describe approach to managing resources and quality results, including a description of the role of any subcontractors, their specific responsibilities, and how their work will be supervised. Describe response mechanisms for dealing with problems and MTC SAFE concerns.
5. Identify potential problem areas, scheduling bottlenecks, critical path items, and any other obstacles to successful and timely completion of this project. Describe how you plan to address and overcome these obstacles.
6. Discuss methods, both formal and informal, used to track and resolve issues that may occur during project lifecycle.

G. Qualifications and References

At a minimum, the information provided in this section should demonstrate that the proposer meets the minimum qualifications set forth in Section IV.

1. Address each one of the minimum qualifications in Section IV.

2. Provide one-page resumes for each staff person assigned to the project, summarizing the individual's training and experience relevant to this project. Include resumes for key subcontractor personnel, as well. (This section may be included as an appendix to the proposal.)

3. Provide at least three references from previous projects similar to this Project, including the project title, a brief description (one page maximum per project) of the projects, the period of performance, the project budget, the sponsoring agency and sponsor Project Manager, and roles played by individuals proposed for this study. Include the name of the contact person, agency for whom the work was performed, telephone number, and year that the work was done. At least one reference for each Major Subcontractor (subcontracts over $100,000) must be included as well.

4. List the major clients of the prime Contractor and any subcontractor involved in evaluating available data integration technology or systems;

5. List any contracts with MTC entered into by the Contractor or any of its subcontractors in the past three years, including a brief description of the scope of work, the contract amount, and date of execution.

6. Provide at least one sample of a written report comparable to the written deliverables required for this project, prepared by key members of the Contractor team (identifying the authors.) One copy only is required, and will be returned after proposal evaluation, upon request.

H. Cost Proposal

1. **Phase I:** Provide a full description of the expected expenditures of funds for the work described in *Appendix A* to this RFP. The cost proposal should include, at a minimum, a detailed task budget, a summary task budget and equipment price list, and a line item budget, as described below:

   a. Detailed Task Budget: The task budget should present a detailed breakdown of Phase I costs and hours and expenses by task and subtask. It should identify or refer to key personnel or job descriptions (with fully loaded hourly rates) in relation to each task to provide a full explanation of the resources committed to the project. No form has been provided for the Detailed Task Budget, but the task subtotals and equipment costs should match the summary totals set forth in *Appendix B,* Summary Task Budget and Equipment Price List (see below.)

   b. A Summary Task Budget is required, as set forth in *Appendix B,* Summary Task Budget and Equipment Price List.

   c. Line Item Budget: The line item budget should present a breakdown of Phase I costs by cost categories, including direct labor, broken down by job

classifications. The line item budget should be set forth on the Cost and Price Analysis Form attached hereto as *Appendix E* to this RFP. A line item budget should also be submitted for proposed subcontractors with contracts estimated to exceed $100,000.

2. **Phase II**: Provide an estimate of the expected cost and equipment prices for Phase II, based on the work described in *Appendix C* to this RFP, and consistent with the Proposer's approach to performing Phase II described in Section V.5 of the Proposal. Proposers may elect to use *Appendix B,* Summary Task Budget and Equipment Price List, as a format for the Phase II cost estimate, or may develop their own forms, as long as all of the cost elements of Phase II are addressed in the estimate.

I. Performance and Payment Bonds

Submit a letter or other signed document from the surety that will be providing the Performance and Payment Bonds or Letter of Credit described in the Letter of Invitation and *Appendix H*, Contract Terms and Conditions, Articles 4.1 and 4.2, including a statement that, if the Proposer is awarded the Contract, Performance and Payment Bonds (or the Letter of Credit in place of the Performance Bond) that meet Contract requirements will be furnished.

J. California Levine Act Statement

Submit a signed Levine Act statement (*Appendix F*)

K. Federal Forms

Submit signed federally required forms, as set forth in *Appendix I* (1-4).

L. Requests for Exceptions or Modifications

If exceptions or modifications to RFP provisions are requested, submit form J-2. An electronic copy may be requested after proposal submission by the Contract Manager.

VI. PROPOSAL EVALUATION

A. Review for General Responsiveness

The Contract Manager, in consultation with the MTC SAFE Office of General Counsel, will conduct an initial review of the proposals for general responsiveness and inclusion of the items requested in *Section V*, Form of Proposal. Any proposal that does not include enough information to permit the evaluators to rate the proposal in any one of the evaluation factors listed below will be considered non-responsive. A proposal that fails to include one or more items requested in *Section V*, Form of Proposal, may be considered complete and generally responsive, if evaluation of every factor is possible.

B. Verification of Minimum Qualifications

The Contract Manager, in consultation with evaluation panel members, will then review responsive proposals to ensure that each proposal meets the minimum qualifications in Section IV of the RFP.

C. Evaluation

Responsive proposals that meet the minimum qualifications will then be evaluated by a panel of MTC, Caltrans and CHP staff on the basis of the four evaluation factors listed below, in order of relative importance. The explanatory bullets within each factor appear in random order and have not been weighted independently.

1. Phase I Resource Allocation and Cost Effectiveness

- Resource allocation (personnel and expenditures), in terms of quality and quantity, to key tasks, including the hours and appropriateness of personnel assigned to each task, key personnel's level of involvement in performing related work cited in the work plan, and logic of project organization; and
- Cost effectiveness, including reasonableness of task budget.

2. System Integration Management Experience and Approach

- Previous project experience (individual project staff including Project Director) as well as the experience of your firm in project management and in CCTV system integration/systems engineering, including similarity of projects, client references, budget and schedule adherence; role of prime consultant in prior project (e.g. prime contractor or subcontractor);
- Overall quality of approach in the detailed work plan and project staffing; logic of project organization; clarity and specificity of work plan; approach to managing the unique needs and risks of camera control management software applications, including process used to track and resolve issues that arise during project lifecycle;
- Approach to conducting and completing Phase I, including but not limited to: 1) understanding of the purpose and requirements of the project; 2) effectively managing and coordinating all project resources, including subcontractors; and 3) ability to meet the project deadlines and, reasonableness of proposed cost and schedule for project completion
- Approach to conducting and completing Phase II full deployment, including but not limited to: 1) understanding of the purpose and requirements of the project; 2) effectively managing and coordinating all project resources, including subcontractors
- Experience working with state and local transportation agencies, particularly with the development and integration of complex hardware/software systems;

3. Technical Experience and Approach

- Range (depth and breadth) of expertise in available CCTV technologies and systems, their costs, their strengths and weaknesses, and applicable standards, including, but not limited to, NTCIP.
- Demonstrate understanding of how CCTV systems are utilized in a TMC and how this prototype is to be developed within that environment. Clearly translate this understanding into a coherent creative approach.
- Documented experience in CCTV system upgrade and integration, including examples of effective project team organization and strength, stability, and technical competence of technical staff;
- Approach to ensuring comprehensive software rights for Caltrans and MTC SAFE.

4. Writing Ability and Communication

- Writing ability and demonstrated ability to present technical information clearly to both technical and non-technical audiences;
- Quality proposal containing concise and clear statements of project objectives, approach, and structure.

Following the initial evaluation, the panel may elect to recommend award to a particular proposer or may enter into discussions with a "short list" of proposers, consisting of those proposers reasonably likely, in the opinion of the panel, to be awarded the contract.

D. Proposer Discussions

The purpose of discussions with a proposer on the "short list" will be to identify to that proposer specific deficiencies and weaknesses in its proposal and to provide the proposer with the opportunity to consider possible approaches to alleviating or eliminating them. These deficiencies or weaknesses may include such things as technical issues, management approach, cost, or team composition. Discussions may take place through written correspondence (including e-mail) and/or face-to-face during interviews. The proposer, as well as other key personnel identified by the evaluation panel, will be expected to participate in any interview/discussions.

MTC SAFE reserves the right to not convene oral interviews/discussions and to make an award on the basis of initial proposals.

E. Request for Best and Final Offer

Following such meetings, the panel may recommend a proposer for award to the MTC SAFE Executive Director, or may issue a Request for Best and Final Offer (BAFO). A Request for BAFO, if issued, may include changes to project requirements necessitated by the discussions. If a Request for BAFO is issued, all "short-listed" proposers will be permitted to submit revisions to their proposals, based on the discussions. After receiving

the BAFOs, the panel will re-evaluate the short-listed proposers. The Project Manager will then recommend a Contractor to the Executive Director. If approved by the Executive Director, the recommendation will be presented to the MTC SAFE Operations Committee for approval.

MTC SAFE reserves the right to select a Contractor as System Integrator for this project on the basis of written proposals alone or to enter into discussions with a single proposer. Further, MTC SAFE reserves the right to accept or reject any and all submitted proposals, to waive minor irregularities, and to request additional information from the Contractors at any phase of the evaluation. Any award made will be to the selected proposer and the proposer whose proposal is most advantageous to MTC SAFE, based on the evaluation criteria outlined below.

VII. GENERAL CONDITIONS

A. Limitations

This request for proposal (RFP) does not commit the MTC SAFE to award a contract or to pay any costs incurred in the preparation of a proposal in response to this RFP.

B. Award

All finalists may be required to participate in negotiations and to submit such price, technical, or other revisions of their proposals as may result from negotiations. MTC SAFE also reserves the right to award the contract without discussion, based upon the initial proposals. Accordingly, each initial proposal should be submitted on the most favorable terms from a price and a technical viewpoint.

C. Binding Offer

A signed proposal submitted to MTC SAFE in response to this RFP shall constitute a binding offer from Contractor to contract with MTC SAFE according to the terms of the proposal for a period of one hundred twenty (120) days after its date of submission, which shall be the date proposals are due to MTC SAFE.

D. Contract Arrangements

The selected Contractor will be expected to execute a contract as set forth in *Appendix H,* Contract Terms & Conditions, which is enclosed with the RFP as a separate document and is hereby incorporated by this reference. The terms and conditions in *Appendix H,* along with the technical and functional requirements for this project, as described in *Appendices* A and C, and the selected proposal will constitute the contract for the project.

Objections to any provision of *Appendix H* on the grounds stated in VII.E below must be submitted no later than one week prior to the due date for the proposals, or they will be deemed to have been waived.

Requests for exceptions or modifications to RFP requirements or provisions, including terms and conditions of the Contract in *Appendix H*, may be made at two times: first, no later than July 14 2004, and second, at the time of submission of the initial proposal. Any exceptions to the terms and conditions of the RFP or Contract made in the Best and Final Offer or after Notice of Award may render a Proposal conditional and ineligible for contract award.

MTC SAFE intends for the contract payment terms for Phase I and II to be lump sum (firm fixed price) with payment made on the basis of receipt by MTC SAFE of satisfactory deliverables.

E. Selection Disputes

A proposer may object to a provision of the RFP on the grounds that it is arbitrary, biased, or unduly restrictive, or to the selection of a particular Contractor on the grounds that MTC SAFE procedures, the provisions of the RFP or applicable provisions of federal, state or local law have been violated or inaccurately or inappropriately applied by submitting to the Contract Manager a written explanation of the basis for the protest:

1) no later than one calendar week prior to the date proposals are due, for objections to RFP provisions; or

2) within five (5) working days after the date on which contract award is authorized or the date the proposer is notified that it was not selected, whichever is later, for objections to Contractor selection.

The evaluation record shall remain confidential until the MTC SAFE Operations Committee authorizes award.

Protests of recommended awards must clearly and specifically describe the basis for the protest in sufficient detail for the MTC review officer to recommend a resolution to the MTC Executive Director.

The MTC Executive Director will respond to the protest in writing, based on the recommendation of a staff review officer. Authorization to award a contract to a particular firm by MTC SAFE Operations Committee shall be deemed conditional until the expiration of the protest period or, if a protest is filed, the issuance of a written response to the protest by the Executive Director.

Should the protesting proposer wish to appeal the decision of the Executive Director, it may file a written appeal with the MTC SAFE Operations Committee, no less than three (3) working days after receipt of the written response from the Executive Director. The SAFE Operations Committee's decision will be the final agency decision.

F. Public Records

This RFP and any material submitted by a proposer in response to this RFP are subject to public inspection under the California Public Records Act (Government Code § 6250 *et seq*.), unless exempt by law. Proposals will remain confidential until the Administration Committee has authorized award.

In order to encourage proposers to share relevant information in their proposals, MTC SAFE will accept as confidential information any technical information that meets the following requirements:

Each proposer must clearly mark each page of the proposal the proposer considers to contain trade secrets or other commercial information that the Proposer believes would cause substantial injury to the proposer's competitive position, if disclosed, and include the following notice at the front of its proposal:

> "The data on the following pages of this proposal, marked along the right margin with a vertical line, contain technical or financial information which are trade secrets and/or which, if disclosed, would cause substantial injury to the proposer's competitive position. The proposer requests that such data be used for the evaluation of its proposal only, but understands that exemption from disclosure will be limited by MTC SAFE's obligations under the California Public Records Act. If a contract is awarded to proposer, MTC SAFE shall have the right to use or disclose the data, unless otherwise provided by law. [List pages]"

Information withheld from disclosure cannot be used to respond to a selection dispute, so proposers should be judicious in their designation of information as confidential, proprietary or a trade secret.

ANY LANGUAGE PURPORTING TO RENDER THE ENTIRE PROPOSAL CONFIDENTIAL OR PROPRIETARY WILL RENDER THE PROPOSAL NONRESPONSIVE AND SUCH PROPOSAL WILL BE RETURNED WITHOUT CONSIDERATION.

Cost Proposals will not be accepted as confidential. However, cost proposals submitted by proposers who are not selected as the System Integrator , together with technical information appropriately marked confidential by such proposers, will be returned to the proposers after the expiration of the selection protest period.

Following issuance of notice of award to a Proposer, including after execution of a contract, if properly marked confidential data are requested pursuant to the California Public Records Act, the proposer will be advised of the request and given the opportunity to provide to MTC SAFE a detailed statement indicating the reasons it believes the information should be withheld from disclosure. The proposer may be asked by MTC

SAFE, as a condition of non-disclosure, to indemnify and hold MTC SAFE harmless, in the event of claims made as a result of non-disclosure.

G. Ownership Rights

MTC SAFE intends for the CCTV system implemented as a result of this RFP to become a permanent foundation of the traffic monitoring system operated through the Caltrans District 4 Traffic Management Center. MTC's Contract with the System Integrator will include provisions intended to guarantee the longevity, accessibility and flexibility of the CCTV system for the long term needs of the system operators representing Caltrans, CHP and TravInfo®, as described in Article 5.2 of the Terms and Conditions, *Appendix H*. Such terms must be passed along to the software vendor/subcontractor. To ensure the maintainability of the system, open source software shall be implemented when possible. MTC SAFE shall be granted a license, as described in Article 5.2 of the Contract Terms and Conditions, to Project Software including source code and source code documentation that is not open source. Local governments/smart corridors are currently collaborating with MTC to implement a plan establishing the center-to-center exchange of video through the Caltrans District 4 CCTV hub system. Granting rights allowing locals/smart corridors to use the IP-based system will be a part of Phase II of this project.

APPENDIX A
SCOPE OF WORK

APPENDIX A – Scope Of Work

Phase I, Part A, B, C, & D

Introduction: (CCTV Prototype System)

The Phase I, CCTV Prototype System services to be performed by System Integrator shall consist of services requested by the MTC SAFE, through the MTC SAFE Contract Manager including, but not limited to, Project Oversight and Associated Technical Services, and Equipment Purchase.

I. Project Description

The CCTV Working Group, including representatives from MTC, Caltrans District 4, and CHP, has identified this prototype system CCTV upgrade project as the first phase of a migration plan to convert the existing Caltrans District 4 analog based CCTV system to an Internet Protocol (IP)-based digital CCTV system. When completed, the Phase I CCTV Prototype System will provide proof-of-concept before entering into Phase II for migration to a full-scale deployment of the ultimate IP-based CCTV system.

After reviewing various upgrade options for the Caltrans District 4 CCTV system upgrade, the CCTV Working Group decided that this CCTV prototype system upgrade should be a centralized video server approach using IP-based video collection and video distribution. The prototype upgrade system establishes an IP-based video collection/distribution and camera control communications network for the Caltrans District 4 CCTV system.

The CCTV prototype system shall provide for an open system that will allow Caltrans to use multiple equipment manufacturers for video encoding and decoding; as well as, different CCTV camera assemblies. In addition to demonstrating the ability to concurrently use varying makes and models of video encoders/decoders, this CCTV prototype system project calls for upgrading three CCTV sites with new camera assemblies. These three new assemblies shall each be of a different make/model.

Two additional enhancements to the CCTV prototype system shall be included, a camera health monitoring system and an Internet Protocol video-sharing network providing web server access for transportation responders. Both of these or any additional enhancements will be reviewed during Phase I, Part A, Task 1 by the Working Group and the System Integrator. The System Integrator is encouraged to provide different enhancement solutions and a cost/benefit analysis. At the direction of the Working Group, the System Integrator will revise the project scope and fee schedule for any modifications to the enhancements.

Of critical importance is that access to all existing cameras is maintained for key incident management stakeholders (the California Highway Patrol (CHP), Caltrans, and TravInfo®) in the Traffic Management Center (TMC) throughout the duration of Phase I

efforts. As part of Phase I efforts, the System Integrator shall incorporate full access to all existing system cameras (in addition to any new system components that have been converted to IP) into the new prototype system; develop a new GUI for access via a workstation that is not running the ATMS software; and develop an intranet web interface GUI. The System Integrator shall make all system cameras available, through both types of GUI, to the users in the Phase I deployment of the prototype system. Access through each type of GUI to all CCTV system cameras must appear seamless to the user.

As part of Phase II, the System Integrator shall upgrade all remaining system camera locations with the new IP-based video encoder and network access components; eliminate all analog video routing devices; and integrate the new IP-based video system control platform into the existing ATMS Graphical User Interface (GUI). Full system functionality shall be available from the ATMS GUI interface as per the standalone interface.

As shown in **Figure 1**, The Phase I CCTV prototype system shall be integrated with all existing CCTV system components that have been identified to remain as an integral part of the new prototype system. Some of these existing components will eventually be phased out in Phase II as the system migrates to the ultimate system configuration, depicted in the *Appendix C*; however, maintaining backwards compatibility to many of these existing investments at the completion of Phase I is crucial to the operational functionality that is needed when this prototype system becomes operational.

In addition to providing the central communications and control framework of the new IP-based system, Phase I CCTV prototype system efforts will also provide a test bed for evaluating the operating performance of several different manufacturer's digital video encoders/decoders and camera assemblies that will be installed as part of this project. Although the primary purpose of using similar equipment types provided by different manufacturers is to demonstrate the openness of the CCTV system, the resulting operating performance of each of these devices will also serve as a baseline for evaluating specific manufacturer products in future deployments.

As part of the Phase I CCTV prototype system efforts, the System Integrator shall develop an automated feature to perform system health monitoring functions that will detect system component failures, generate trouble tickets for maintenance staff, and provide operators with status updates of system components that are offline due to planned or unplanned maintenance.

For a quick summary of the various prototype system components and associated quantities of these components see *Appendix B* – Summary of Task Budget and Equipment Price List**.** See **Figure 2,** for a block diagram of the existing CCTV System configuration.

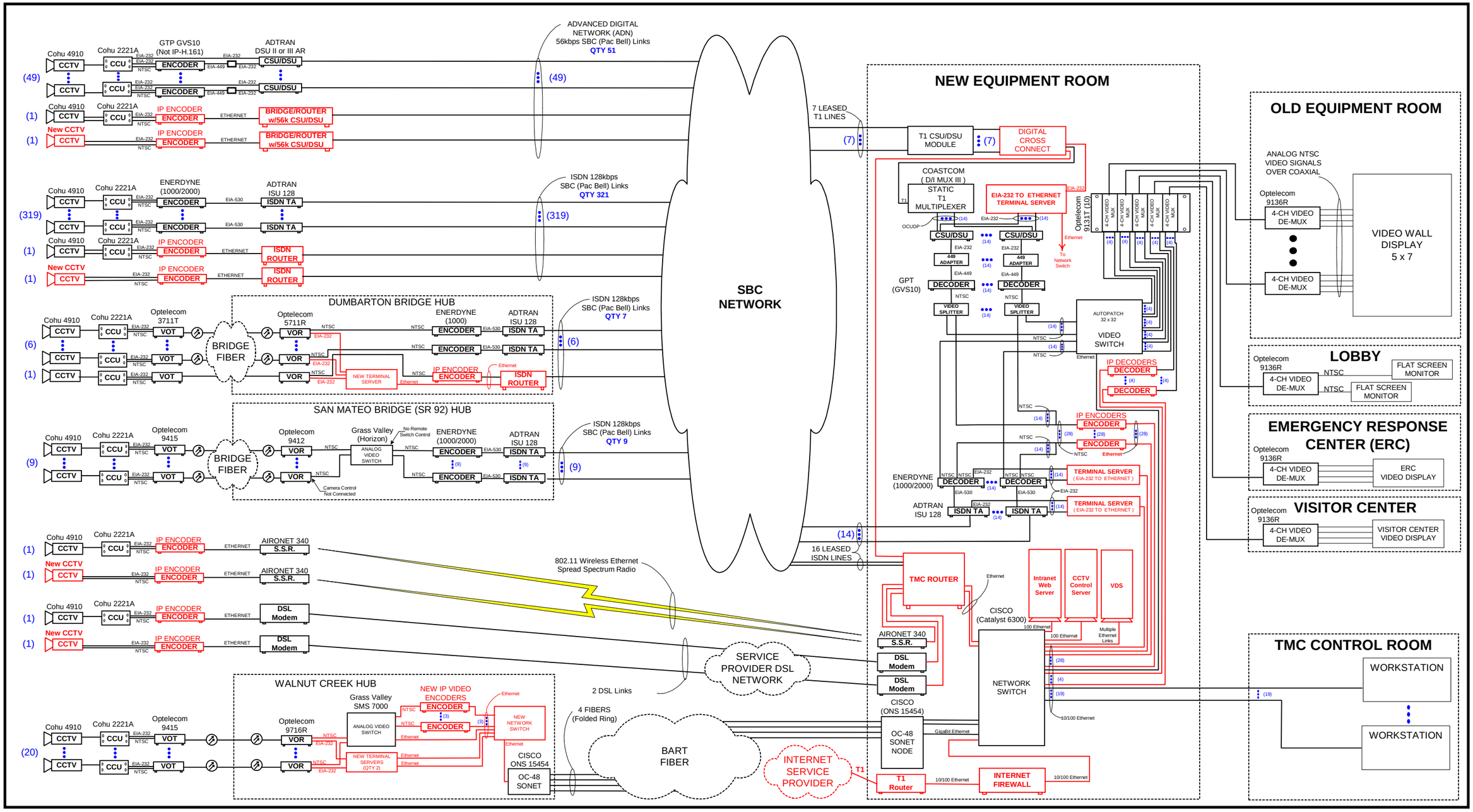

Figure 1: Proposed CCTV Prototype System Block Diagram

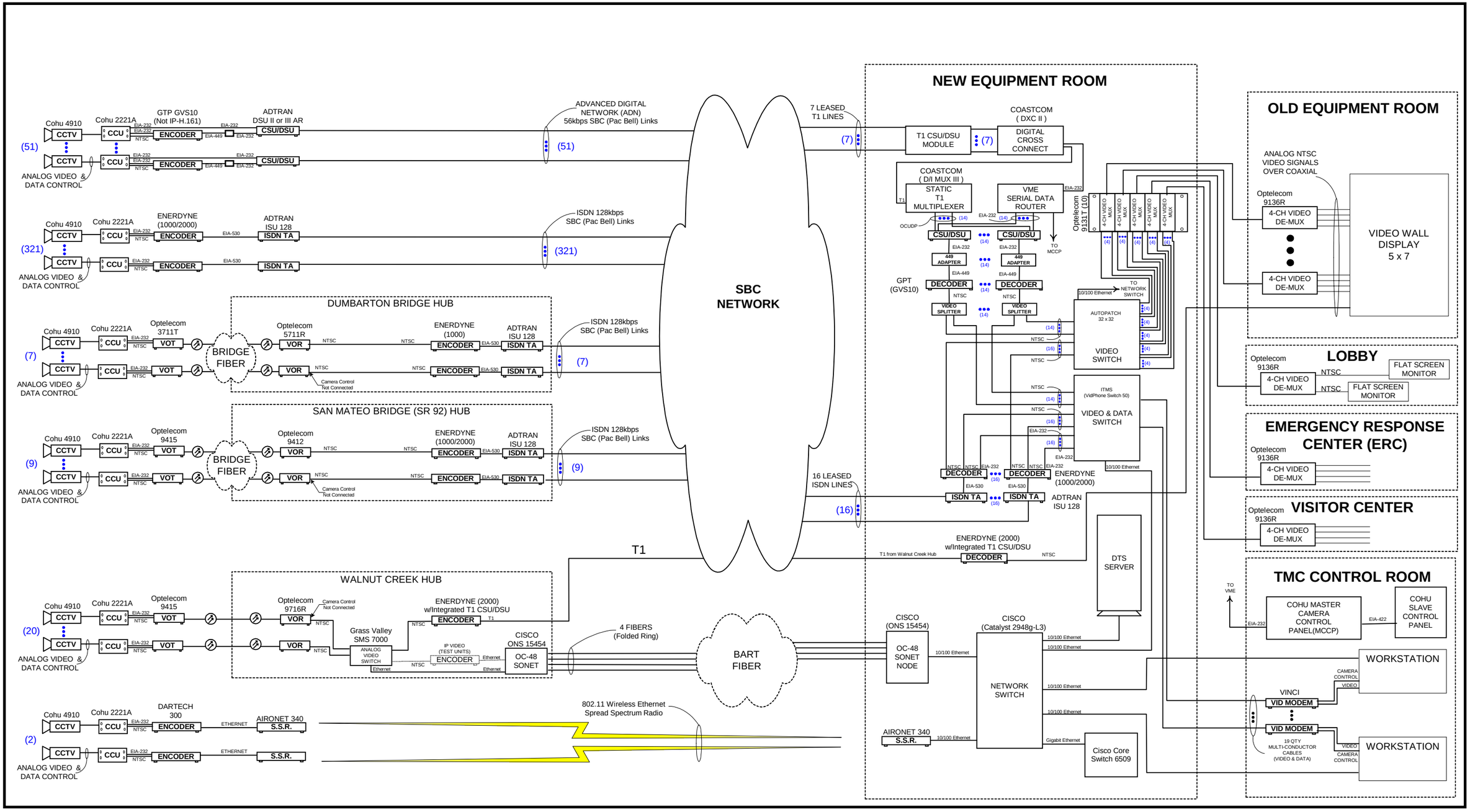

Figure 2: Existing CCTV System Block Diagram

II. Prototype System General Requirements

The System Integrator selected for the CCTV prototype system project shall coordinate all project related items with the Caltrans Project Manager and the MTC SAFE Contract Manager. The Caltrans Project Manager will serve as the technical liaison between the System Integrator and the CCTV Working Group and will facilitate access to software, hardware and field equipment. The Caltrans Project Manager will coordinate the daily progress of project work activities.

The Contract Manager will oversee the contract related functions such as keeping track of expenditures, approving invoices, and tracking the schedule for deliverables. The Contract Manager shall keep the Project Manager informed of the current budget and expenditures and authorize all expenditures. The Project Manager shall not authorize or approve any expenditure under this agreement.

Both the Project and Contract Managers will serve as project information facilitators and coordinators between the System Integrator and CCTV Working Group. This applies to any other third party project representatives that the CCTV Working Group deems necessary to keep the project moving forward in the direction desired by the project stakeholders. Any project related decisions or direction provided to the System Integrator from persons other than the Project Manager and the Contract Manager shall not be considered final until confirmation from both managers is obtained.

The CCTV contract will be managed and administered by MTC SAFE staff through the Contract Manager. MTC SAFE expects that the various roles and responsibilities of the System Integrator and members of the CCTV Working Group in relation to other project team participants will be as follows: (The CCTV System Integrator may propose modifications and additions to this in its project plan.)

- CCTV System Integrator: The System Integrator has overall responsibility for managing all phases of this project, including all communications with and between MTC SAFE, Caltrans and all other project team members.
- Other System Integrator Team Members: Other System Integrator team members (including Prime and any Subcontractor staff)will have specific duties under the adopted project plan. To the greatest possible extent, all System Integrator team members should have easy access to the Project Manager and the Contract Managers, to promote the rapid identification and resolution of problems.
- MTC SAFE Contract Manager and the Caltrans Project Manager: The MTC SAFE Contract Manager will be MTC SAFE's principal point of contact with the System Integrator. The Caltrans Project Manager will review all deliverables and will recommend acceptance or rejection to the Contract Manager at every stage of the testing process. The Contract Manager will handle all deliverable-based expenditures. Both the Contract and the Project Managers will serve as exclusive contacts between the System Integrator and the CCTV Working

Group. The Contract Manager will be responsible for all the contract administrative functions. The Contract Manager may delegate some of these duties as needed over the course of the project, and will so notify the System Integrator.

- CCTV Working Group: The MTC SAFE Contract Manager will convene the CCTV Working Group for the project. The Working Group will serve as the advisory committee for the project and will be comprised of staff representatives from each of the stakeholders (currently Caltrans, MTC SAFE, CHP). The CCTV System Integrator will be expected to participate in and provide support for the Working Group through the Contract and Project Managers.
- System Integrator Project Coordination: The System Integrator will coordinate all project related items with the Project and Contract Managers. **Figure 3** describes the organizational structure for decision-making. On matters affecting the project schedule, scope of work and project costs, the System Integrator will make the first point of contact with the Contract Manager. Daily project implementation will be directed to the Project Manager.

    1. Prototype Implementation and TMC Operations: The System Integrator will work directly with the Project Manager to manage the delivery, installation and testing of all software and hardware components both within the TMC and at all field locations.
    2. Project Modification Approval: The Project Manager will advise and recommend a course of action regarding the System Integrator proposal to modify the project and such a decision to modify the project will require review and approval of the Working Group.
    3. Invoices: The System Integrator will send invoices to MTC SAFE for approval by the Contract Manager. The Contract Manager will consult with the Project Manager concerning the deliverables submitted by the System Integrator. All summary reports, system documentation, diagrams and schedules will be provided by the System Integrator to the Contract and Project Managers in the format indicated for each deliverable.
    4. Unanticipated Expenditures: The System Integrator, prior to any invoicing, will first bring unanticipated expenditures to the attention of the Contract Manager. The Contract and Project Manager will review the reason(s) for the unanticipated expenditures provided by the System Integrator.

All references to written deliverables in this scope of work include one draft and one final version, unless otherwise specified. All draft deliverables will be referred to and commented on by MTC SAFE and the project advisory committee, and comments will be integrated into the final deliverable. In some cases, the deliverable is an object (like the working database) or an activity (like training), rather than a written report, where the draft and final approach may not apply.

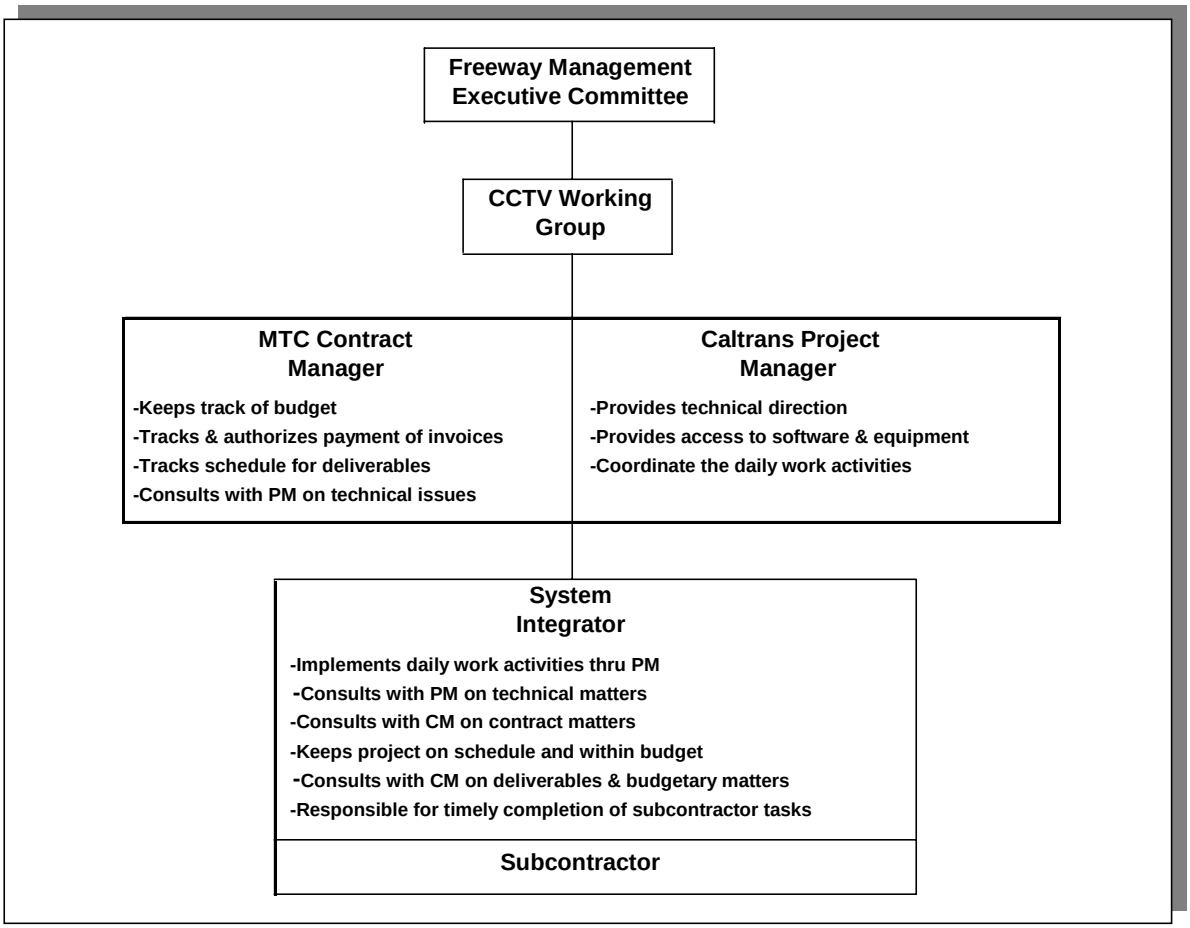

Figure 3 : Project Implementation Organizational Chart

The proposer is invited to suggest modifications to the scope, sequence, and content of the tasks that follow, as well as recommend additional tasks that would enhance successful accomplishment of the project's objectives.

Phase I, Part A. Prototype Design & Lab Demonstration

Task 1 Project Kickoff, Final Detailed Work Scope, and Project Schedule

In consultation with the CCTV Working Group and the Project Manager, the System Integrator shall initiate a project kickoff meeting to obtain direction on necessary changes to the Detailed Work Scope and schedule, prior to submitting a Final Detailed Work Scope and Project Schedule and to review plans for coordinating the implementation of the required scope of work activities in cooperation with all project stakeholders. As a result of this meeting and any necessary follow-up meetings, the System Integrator shall develop and submit a Final Detailed Work Scope and Project Schedule, addressing all

activities to be undertaken in order to effectively accomplish objectives of all stakeholders.

When developing the Project Schedule, the System Integrator shall maintain the current operational functionality of the existing systems and shall provide for minimal disruptions during the transition to the new prototype system. All proposed disruptions to the existing system shall be planned for in advanced by the System Integrator, as well as coordinated and approved by the Project Manager. Approval of the changes to the Project Schedule shall be made in accordance with Article 2.4 of the Contract Terms and Conditions (*Appendix H*.)

The System Integrator shall ensure that compatibility of software and basic file formats used in the delivery of work products is maintained in accordance with standards determined by, and acceptable to MTC SAFE and the Working Group.

Deliverable 1A-1: A draft summary of all issues and action items raised as well as required solutions for project coordination and implementation (submitted electronic file format) for review and approval by the CCTV Working Group.

Deliverable 1A-2: A final summary of all issues and action items raised as well as required solutions for project coordination and implementation (submitted in hard copy and electronic file format).

Deliverable 1A-3: A Draft Detailed Work Scope in Microsoft Word and submitted in electronic file format for review and approval by the Work Group.

Deliverable 1A-4: A Final Detailed Work Scope developed in Microsoft Word and submitted in hard copy and electronic file format.

Deliverable 1A-5: A draft Project Schedule developed on Microsoft Project submitted in electronic file format for review and approval of the Work Group.

Deliverable 1A-6: A Final Project Schedule developed on Microsoft Project submitted in hard copy and electronic file format.

The System Integrator shall make any necessary updates to the project schedule as the work progresses throughout the project, pursuant to Article 2.6 of the Terms and Conditions of the Contract (*Appendix H*).

Contingent on MTC SAFE approval of the Final Detailed Work Scope and Project Schedule, MTC SAFE shall issue to the System Integrator a Notice to Proceed to Phase I, Tasks 2 and 3.

Task 2 Video Encoder/Decoder Pre-evaluation Test Bed

The System Integrator shall coordinate with the various video encoder/decoder equipment manufacturers and submit a list, to the Project Manager for approval, of ten different video encoder devices and ten decoder devices that the System Integrator recommends for use in the video encoder/decoder pre-evaluation test bed. The list that the System Integrator submits shall clearly identify each manufacturer, model number, and all equipment hardware and software options needed to achieve the IP-based system requirements; as well as, the order of preference that the System Integrator recommends for selecting which devices should be tested.

a. Based on the approval of the ten candidate encoder and ten candidate decoder devices and the order of preference for testing, the System Integrator shall coordinate and conduct a video encoder/decoder pre-evaluation test bed with a minimum of five different encoder manufacturers and five different decoder manufacturers to evaluate the products available in the current market.

The evaluation criteria shall at a minimum cover the following:

- video latency introduced,
- codec hardware and software stability,
- ability to achieve the environmental operating conditions (encoders only),
- video quality (resolution and frames-per-second) at different transmission rates when displayed on an analog monitor (decoder only),
- video quality (resolution and frames-per-second) at different transmission rates when displayed using three different industry standard digital video players such as Windows Media Player™, Real Player™, Darwin/QuickTime™, or an approved equivalent (encoders only),
- compatibility with the VDS software being proposed (encoders only), and
- video codec device cost (both list price and contract discount for Phase I & II deployment).
- Ease of maintainability and health monitoring

If less than three of the initial five video encoder/decoder devices tested do not satisfactorily (per the discretion of the Project and Contract Managers) pass the pre-evaluation test bed, then the System Integrator shall continue the evaluation by adding additional test devices from different manufacturers and updating the report until a minimum of three video encoder devices and three video decoder devices satisfactorily (per the discretion of the Project and Contract Managers) pass the pre-evaluation test bed.

The System Integrator shall identify the test bed configuration, testing procedures, and proposed evaluation criteria within a written report with the proposed equipment connection diagram and submit this report to both the Project and Contract Managers for approval. Once the report is approved, the System Integrator shall proceed with scheduling of the tests and all other logistics needed to successfully conduct the tests.

b. Once all the tests are completed, the System Integrator shall provide the Project Manager with a summary report of the test results including a brief narrative of all problems that may have been encountered during the tests and a list of each product tested with the associated numerical score indicating how each product performed when compared to the others. The System Integrator shall involve CCTV operators in the test bed testing procedures and their comments and feedback shall be documented in the summary report of the test results. After evaluation of the final summary report, the Project Manager will provide the System Integrator with a list identifying the video encoder/decoder products that shall be provided by the System Integrator for use in the prototype system.

Deliverable 2A-1: A draft list of ten different video encoder devices and ten different decoder devices that the System Integrator recommends for use in the video encoder/decoder pre-evaluation test bed and the order of preference that the System Integrator recommends for selecting which devices should be tested.

Deliverable 2A-2: A final list of ten different video encoder/decoder devices (with manufacturer and model numbers) that the System Integrator recommends for use in the video encoder/decoder pre-evaluation test bed and the order of preference that the System Integrator recommends for selecting which devices should be tested.

Deliverable 2A-3: A draft report identifying the test bed configuration, testing procedures, and proposed evaluation criteria with the proposed equipment connection diagram for review and approval by the Work Group.

Deliverable 2A-4: A final report identifying the test bed configuration, testing procedures, and proposed evaluation criteria with the proposed equipment connection diagram.

Deliverable 2A-5: A draft summary report of the test results including a brief narrative of all problems that may have been encountered during the tests and a list of each product tested with the associated numerical score indicating how each product performed when compared to the others and which products satisfactorily pass per the discretion of the Project and Contract Managers.

Deliverable 2A-6: A final summary report of the test results including a brief narrative of all problems that may have been encountered during the tests and a list of each product tested with the associated numerical score indicating how each product performed when compared to the others.

Task 3 Engineering Services and Documentation

a. To accommodate the CCTV prototype system functional requirements identified in this scope and create a baseline system capable of future expansion and enhancement, the

System Integrator is required to provide the necessary engineering services to complete the design and integration of the prototype system as well as provide documentation of the specific design details and all proposed hardware, software, and communications network elements of the proposed CCTV prototype system. The System Integrator shall not deviate from the requirements identified in this scope without written approval from both the Contract and the Project Managers.

b. In order to satisfy budget and schedule constraints, the System Integrator shall coordinate with the Project Manager during the design of the system and perform value-engineering activities during all stages of the CCTV prototype system design and implementation. Written approval from the Project Manager on all value-engineering recommendations from the System Integrator is required before the System Integrator can proceed with any design deviations. Value-engineering recommendations must be reviewed by the Working Group and will be evaluated based on budget, schedule, and the objective of demonstrating the concept of an integrated IP-based video collection, distribution, and camera control management system that is compatible with existing operationally necessary equipment investments. Approval of any value-engineering recommendation is at the sole discretion of the CCTV Working Group representing the project stakeholders.

c. The System Integrator shall ensure that all existing custom or proprietary system components are eliminated from the design if they restrict the System Integrator's ability to achieve a completely open system that allows different hardware and software products be added to the system in the future through integration services performed by other. It is the intent of MTC SAFE and the Project stakeholders that the entire CCTV prototype system shall be fully and completely available to MTC SAFE and Caltrans for use throughout the State of California during the term of the Project and beyond, without the need for payment of additional license fees or negotiation of additional terms. The System Integrator shall make every effort to minimize custom software development and deploy commercial "off-the-shelf" products. To ensure the maintainability of the system, open source software shall be implemented when possible. When not possible, MTC SAFE and Caltrans shall retain, as part of this project, full license rights, as set forth in Article 5.2 of the Contract Terms and Conditions (*Appendix H*), to any customized or proprietary software.

d. The System Integrator shall make engineering decisions when it comes to hardware and software designs and equipment selections that minimize video and camera command latency. Given budgetary constraints, it may not be possible to achieve an optimal latency in all situations where the system is backwards compatible to existing equipment; however, all new system software and hardware elements which do not rely on existing system components that cause video and camera command latency shall be designed and selected based on their ability to minimize video and camera command latency. A new system component that is found to cause an inordinate amount of latency (per the opinion of the Project Manager) which hinders an operator's ability to control cameras and view displays shall be replaced by the System Integrator and at the cost of the System

Integrator unless the latency is clearly attributable to sources independent of the new system component.

e. The System Integrator shall ensure that all hardware being proposed for the system is compliant with Caltrans' standard specifications and standards, as set forth in "Standards Plans", the "Special Provisions" and Caltrans policy. It is understood that certain specifications detailed in these documents may be out of date or inconsistent with the goals of this project. Therefore, any proposed change to specifications will be considered on a case-by-case basis. Any deviation shall be only by written approval of the Project Manager.

Copies of the Caltrans' Standard Plans and the Special Provisions which detail the specifications of existing equipment manufacturers and model numbers currently being used in the Caltrans District 4 CCTV system will be furnished to the proposers upon request.

f. The System Integrator shall be responsible for installing each type of CCTV GUI application on up to five workstations at locations identified by the Project Manager in the TMC facility. The System Integrator shall also coordinate, organize, and conduct up to two separate hands-on training classes that walk through the installation process, off-the-shelf software requirements, hardware minimal and optimal requirements for the workstation, and all operator and system administrator functions of the all CCTV GUI applications. The Project Manager will identify attendees of the hands-on training classes, and the Project Manager will provide the facility for the training. The System Integrator shall be responsible for coordination and providing all equipment needed for the training classes.

g. The System Integrator shall develop a detailed Cutover Plan for switching over to new IP-based system as the sole control and routing platform for all of the CCTV system components that will remain in place at the completion of Phase I. This Cutover Plan shall provide a staged approach that minimizes planned down time and the impact of unplanned down time in the event that a problem with the new system occurs. It shall address how and when the operators will be informed of which cameras need to be accessed by which system (new or old) during the staged cutover period. (Note that the new GUI software needs to be able to control all new and existing cameras that will remain in place at the completion of Phase I, but the existing DTS provided GUI/and software does not need to control any new devices being added to the system.) The Cutover Plan shall address the cutover time anticipated for each stage and the stability testing that should occur before moving on to the next stage to add more devices to the new system. The Cutover plan shall also provide for a back-up plan at each stage for reverting back to the old system platform in the event that a problem occurs with the new system that causes it to be taken off line to perform the corrective measures needed to fix the problem. The Cutover plan shall include adequate notice for any other organizations now accessing Caltrans CCTV images (such as CHP and TravInfo®), to implement any required changes on their end. Note: This must be specifically cited in the schedule.

h. The System Integrator shall develop a detailed functional description of the proposed health monitoring management system describing system functions that will be monitored and how the system integrator proposes to implement monitoring these functions in an automated process, from an operator interface perspective, a system administrator interface perspective, and from a maintenance staff interface perspective.

The following are the minimum functional requirements of the health monitoring management system:

- Provide CCTV camera status check routine that shall confirm that each of the CCTV functions is properly functioning.
- Provide all automated health monitoring checks that do not require operator intervention of system components that have built-in system diagnostics (i.e., system devices that support Remote Monitoring (RMON), a standard monitoring specification to exchange network-monitoring data).
- Provide a database for tracking the status of various system components; as well as, keep a history of when problems were identified, the device, and the time each problem was corrected.
- Provide an automated maintenance trouble ticket report and tracking system that can be used to notify maintenance staff of system component problems and inform the operators of known problems that have been reported to maintenance staff.

As part of the health monitoring management system deliverable effort, the System Integrator shall conduct a meeting with the project stakeholders and solicit input from the project stakeholders that identifies the various types of functional and operational requirements that the health monitoring management system should provide. Prior to this initial health monitoring management system meeting with the project stakeholders, the System Integrator shall submit a summary of all system components (from the camera assembly devices in the field locations through to every end device display location) with the System Integrators recommendations on what component functions should (or should not) be included in the health monitoring management system.

Based on input obtained from the initial health monitoring management system meeting with the project stakeholders, the System Integrator shall research the feasibility of achieving the health monitoring management system functionality for each system component, identify various alternative approaches for obtaining this functionality, provide a summary of the pros and cons to each alternative (including cost impacts and ability to achieve an open system), and develop diagrams that may be necessary to illustrate the differences between the alternative approaches. The System Integrator shall submit this summary to the Project and Contract Managers a minimum of two weeks prior to the next health monitoring management system meeting with the project stakeholders.

At the second health monitoring management system meeting with the project stakeholders the System Integrator shall go through the alternatives summary and build consensus on the various alternative approaches that will ultimately be required functions for the health monitoring management system.

After the second health monitoring management system meeting with the project stakeholders, the System Integrator shall develop a document defining the various health monitoring management system off-the-shelf hardware and/or software components, defining the functional requirements for any new custom software and/or hardware that need to be developed, and the associated cost of each hardware and software component within the health monitoring management system.

i. Depending on the availability of funds, MTC SAFE may negotiate additional system enhancements.

Deliverable 3A-1: A complete set of hardware and off-the-shelf software submittal documentations including system connection diagrams of all proposed devices and associated quantities; equipment manufacturer specifications with all hardware, software, and electrical power options proposed for use clearly identified; vendor documentation on all off-the-shelf software proposed for use with any and all proposed options; and a detailed description of all proposed custom software identifying all sub-system software components and functions.

Deliverable 3A-2: A complete set of as-built documentation covering all specific design details including system connection diagrams (Microsoft Project) with all hardware (make and model numbers) and the specific communication interfaces standards, connectors and any adapters used; all off-the-shelf software (name, version number, and license number) for all communication hardware, servers, and workstations; a detailed breakdown describing all system protocols with the configurations/assignments of associated fields; a detailed breakdown describing all system Application Programmer's Interfaces (API) with the configuration/assignments of associated fields.

Deliverable 3A-3: Five draft non-copyrighted copies of all necessary documentation needed to install, operate, and maintain/configure the CCTV GUI applications being installed for review and approval by the Work Group.

Deliverable 3A-4: Five final non-copyrighted copies of all necessary documentation needed to install, operate, and maintain/configure the CCTV GUI applications being installed.

Deliverable 3A-5: Draft set of training class documentation including the agenda, schedule, description of the installation process, description of the off-the-shelf software requirements, description of the hardware minimal and optimal requirements for the workstation, and description of all operator and system administrator functions for each of the CCTV GUI applications, for review and approval by the Work Group.

Deliverable 3A-6: Twenty-five final and complete sets of training class documentation including the agenda, schedule, description of the installation process, description of the off-the-shelf software requirements, description of the hardware minimal and optimal requirements for the workstation, and description of all operator and system administrator functions for each of the CCTV GUI applications.

Deliverable 3A-7: All warranty documentation as set forth in *Appendix H*, Contract Terms and Conditions, Article 9, organized in a 3 ring binder with plastic document covers, and a summary table identifying each warranty, the starting date, the ending date and any key information/dates needed to extend the warranties.

Deliverable 3A-8: All activities identified in Task 3 required to develop the detailed functional description and associated cost of the health monitoring management system.

Deliverable 3A-9: All activities identified in Task 3 required to be develop the Cutover Plan for switching over to new IP-based system as the sole control and routing platform for all of the CCTV system components that will remain in place at the completion of Phase I.

Contingent on System Integrator's satisfactory completion of Tasks 2 and 3 above, MTC SAFE shall issue to the System Integrator a Notice to Proceed to Phase I, Tasks 4.

Task 4 Equipment & Software Procurement, Development, Delivery, Installation, Configuration & Integration

a. The System Integrator shall order, develop, deliver, install, configure and integrate all hardware and software items identified on the Hardware and Software Item Cost Schedule in *Appendix B*, Summary of Project Budget and Equipment Price List.

All new equipment, including hardware and software, shall be furnished and installed by the System Integrator after approval by the Project Manager.

b. All hardware and software shall have a three (3) years warranty with an option to extend. All manufacturer and/or distributor (3) years warranties shall be transferable to Caltrans and successfully transferred to Caltrans prior to Final Acceptance. The three (3) year warranty period for all hardware and software shall commence on the date Final Acceptance is granted. Additional warranty requirements are set forth in *Appendix H*, Contract Terms & Conditions, Article 9.

c. A critical element in the development of the integrated CCTV prototype system is the support of multiple center-to-field device communication protocols. The System Integrator shall provide a CCTV prototype system that demonstrates successful integration of the current unique version of Cohu protocol in District 4, Cohu's latest published standard protocol supplied with the 3920 Series i-dome, the Cohu NTCIP protocol supplied with the 3950 series integrated camera solution, and RVision (see

www.drayvision.com) Enhanced VISCATM protocol supplied with their SEETM 820017 pan/tilt/zoom camera assembly. When designing and developing the system monitoring and control platform, the System Integrator shall make provisions for adding a minimum of 20 additional center-to-field device communication protocols for future use in the system. The System Integrator shall propose a configuration control approach for the tracking of software and hardware and any changes that may occur.

d. The new video encoders and decoders provided by the System Integrator shall support variable bit rates and have the capability to support both unicast and multicast video streaming (note that multicast video streaming will be enabled in Phase II when a second video distribution server is added). At locations where multiple video encoders or decoders are located, the System Integrator is encouraged to explore cost savings opportunities in using single units that support multiple analog video inputs/outputs, simultaneous encoding/decoding of analog video signals, and provides/accepts multiple IP video streams.

e. The most significant component in developing an integrated CCTV prototype system is the creation of the system's CCTV Control Server software and the various CCTV GUI applications. Even though the actual prototype system uses highly diverse hardware and firmware components, operators using the system are to have the perception that it is one functional CCTV system. The System Integrator shall achieve this operator perception by integrating the various system components into integrated software interfaces (i.e., a new standalone GUI, and the intranet web GUI). The System Integrator shall pay particular attention to this requirement in the design/selection of the software for the CCTV prototype system.

The System Integrator shall ensure that the CCTV prototype system controls and manages all existing and new CCTV system elements and corresponding functionality through the System Integrator-provided integrated CCTV GUI applications that will be running on multiple local and remote operator workstations concurrently. The prototype system provided shall not be limited to a maximum number of concurrently running CCTV GUI applications. Caltrans shall have the rights to install the CCTV GUI applications on any operator workstation with a compatible Windows™ operating system regardless of the workstation's jurisdictional location. There shall be no licensing fees associated with the System Integrator-provided CCTV GUI applications, and Caltrans shall not be obligated in any way to inform the System Integrator of when or where the CCTV GUI applications are to be installed once the CCTV prototype system is accepted.

f. In addition to the other functional requirements identified in this scope, the CCTV GUI applications of the prototype system shall allow for the selection of video streams from field locations to be displayed at the requesting client's workstation. The CCTV GUI applications shall also allow the operator to display a video stream on display devices other than his/her own computer monitor such as other video stream clients or NTSC-based monitor devices.

The System Integrator shall provide a new standalone Caltrans District 4 area map integrated to the new System Integrator provided CCTV GUI application for standalone TMC workstations. The System Integrator can port over a CCTV GUI application software package that has been developed for a similar system in a different jurisdiction, develop the CCTV GUI application from scratch, or propose a different alternative not identified above.

Contingent on successful completion of Phase I, in Phase II the System Integrator shall integrate the CCTV GUI applications into the current ATMS map application running on the TMC workstations.

The System Integrator shall provide a CCTV GUI application that utilizes the latest Windows™ Professional Operating System platform available during development. The CCTV GUI application shall be backward compatible to earlier Windows™ Operating System Platforms (Windows NT & 2000).

g. The System Integrator shall conduct four (4) Detailed Software Design Reviews with the appropriate technical, operational, and management personnel. The System Integrator shall involve CCTV operators in the review process and their comments and feedback shall be documented. Design Review participants will be determined by the CCTV Working Group. Two (2) of the Design Reviews are to be held prior to the development and integration of software. Two (2) of the Design Reviews are to be held after the software demonstration mentioned below. The System Integrator shall document all Detail Software Design Reviews and provide detailed software flow charts.

h. The System Integrator shall develop and provide a Prototype Lab Demonstration including CCTV GUI application that demonstrates the proposed operator interface and server software functionality prior to integrating to any legacy TMC video systems. The System Integrator shall coordinate, setup, and conduct a Lab Demonstration of this software development, including CCTV GUI application interface, to the Working Group with a minimum of five (5) lab CCTV configurations depicting possible field scenarios of various encoding technologies and vendors.

The demonstration shall be conducted with the new System Integrator provided Caltrans District 4 area map that has sample camera location icons configured in a close cluster (0.5 mile spacing) to demonstrate how the icons will be displayed when zoomed in and out of a particular area. The demonstration software shall be provided with the System Integrator proposed video player software and demonstrate the launching of the video player viewing window when a camera icon is selected.

The demonstration software shall be provided with preliminary CCTV camera control operator interface window that is also launched when a camera icon is selected. The demonstration software shall demonstrate how CCTV site-specific controls and viewing can be selected from the drop down menus at the top of the screen. The demonstration

software shall also demonstrate the proposed operator interface controls for routing video images to a static display screen location (i.e. the TMC video wall).

During the demonstration, the System Integrator shall point out any proposed differences between the functionality being demonstrated on the lab demonstration CCTV GUI application and the functionality being proposed.

System Integrator shall take notes on what the CCTV Working Group liked and did not like about the software development prototype CCTV GUI application and provide a summary report documenting the comments made and any recommended courses of action that the System Integrator will take to develop a CCTV GUI application that meets or exceeds the expectations of the CCTV Working Group. The System Integrator shall involve CCTV operators in the lab demonstration and their comments and feedback shall be documented in the summary report.

i. Any such changes in the direction of how the CCTV GUI application is to be developed that are consistent with the System Requirements in *Appendix A, Section III*, shall not be grounds for additional compensation to recover any prior development efforts. However, the System Integrator may be eligible for recovering the direct cost of some off-the-shelf software purchases that will not be used in the system if the off-the-shelf software was previously approved for use, the receipts from the store(s) of where the software was purchased is furnished by the System Integrator, and the System Integrator provides the Project Manager with the software and all package materials that came with the software purchases. All software licensing and summary tables in Deliverable 4G shall be provided to the Contract Manager.

Deliverable 4A-1: A CD with the software Lab Demonstration applications with the new Caltrans district 4 area map.

Deliverable 4A-2: A draft summary report documenting the comments and any recommended courses of action resulting from the Lab Demonstration.

Deliverable 4A-3: A final summary report documenting the comments and any recommended courses of action resulting from the Lab Demonstration.

.

Deliverable 4A-4: A complete and fully functional CCTV prototype system that meets all the requirements identified within this scope of services.

Deliverable 4A-5: Detailed Software Design Review documentation, including all software requirements, detailed software flow charts, a list of all software to be provided under the Contract, a designation of whether it is Open Source, Commercial or Customized, as those terms are defined in Article 5.2.1 of the Contract Terms and Conditions, and a list of all applicable software development tools (all software required to operate the software, including operating systems, libraries, tools and utilities, data

base structures and code and compilers; to alter/edit the source code; and/or to successfully recompile the software).

Deliverable 4A-6: Two sets of CCTV server installation software, CCTV non-ATMS (Standalone) workstation application installation software, and CCTV intranet web server installation software on read only CD format, two hardcopy bounded sets non-copyrighted installation documentation, and two electronic copies on read only CD format of the installation documentation for all software.

Deliverable 4A-7: Two sets of CCTV server software source code, CCTV non-ATMS (Standalone) workstation application software source code, and CCTV intranet web server software source code on read only CD format, two hardcopy bounded sets non-copyrighted source code documentation, and two electronic copies on read only CD format of the source code documentation for all custom software. Submission of this deliverable is not required prior to MTC SAFE's acceptance of and payment for Deliverables 4A1 through 6.

Deliverable 4A-8: All software licenses. Deliverable shall include a summary table that identifies each type of software furnished, the function it provides in the system, and the associated license number.

Contingent on the successful completion of Phase I, Part A, including all deliverables and requirements, the MTC SAFE Contract Manager shall issue to the System Integrator a Notice to Proceed to Phase I, Part B.

Phase I, Part B. Prototype Field Integration

Task 5 Prototype Field Integration

a. Upon the successful completion of Phase I, Part A and receipt of the Notice to Proceed, the System Integrator shall proceed with the installation, integration, deployment, testing and demonstration of full operability of the prototype CCTV system and GUI, providing seamless access to 20 existing camera locations with various combinations of existing and new equipment.

During this integration phase, the CCTV GUI application shall be tested to operate on a standalone workstation and on a workstation concurrently running the ATMS software, to ensure there are no configuration management problems running both software applications simultaneously; however, integration of the CCTV GUI into the ATMS will occur in Phase 2. This application is referred to in Deliverable 5B-2 and 3 as the Lab Demonstration application.

The 20 camera field locations shall include various field configuration combinations that combine existing field CCTV conditions, including existing CCTV video and codec equipment, existing telecommunication technologies, with new IP CCTV, codec equipment, and telecommunication technologies. All 20 camera locations and equipment combinations shall be approved by the Project Manager prior to integration.

Disruptions to TMC systems and operations shall be minimized during integration to legacy TMC video systems and may be required to be scheduled during off-peak hours as determined by the Engineer.

b. Prior to the completion of Phase I, Part B, the System Integrator shall provide system acceptance testing that demonstrates the functionality, stability, and reliability of the system. The System Integrator shall furnish proposed acceptance test procedures to the Project Manager for approval that provides for the testing of all system functionality and provides a description of the test methodology for each function. The proposed acceptance test procedures shall include specific steps for testing the system and component security, including (but not limited to) trying to "break" the proposed security and detecting intrusion attempts. Procedures shall be included for testing video sharing with external organizations. Additional procedures for testing the configuration control approach shall also be included by the System Integrator. The submitted test procedure shall include an entry for pass or fail of each system function and a field for comments. The System Integrator shall involve CCTV operators in the acceptance testing procedures and their comments and feedback shall be documented in the summary report of the test results.

The System Integrator shall execute acceptance testing after the system has been fully integrated to include 20 new CCTV locations per Phase I Part B and the Project Manager has approved the test procedures. Testing shall be performed under the presence of test representatives as identified by the CCTV Working Group. Deficiencies identified during the test shall be documented, corrected and retested by the System Integrator.

In the event of a failure during the acceptance testing, the System Integrator shall replace or repair the equipment prior to the Issuance of the Notice to Proceed to Phase I, Part C. Software licensing and documentation in Deliverable 5G shall be provided to the Contract Manager.

Deliverable 5B-1: A CD with the updated software applications, including system and configuration files.

Deliverable 5B-2: A draft summary report documenting the courses of action resulting from the Lab Demonstration and implemented resolution in Phase I, Part B.

Deliverable 5B-3: A final summary report documenting the courses of action resulting from the Lab Demonstration and implemented resolution in Phase I, Part B.

Deliverable 5B-4: Draft Acceptance Test Procedures. A draft electronic copy of the proposed acceptance test procedures to be reviewed and approved by the CCTV Working Group. .

Deliverable 5B-5: Final Acceptance Test Procedures, approved by the Project Manager. (electronic and hard copies.)

Deliverable 5B-6: A complete and fully functional CCTV prototype system that meets all the requirements identified within this scope of services.

Deliverable 5B-7: Detailed updated Software Design Review documentation, including all software requirements, detailed software flow charts, a list of all software to be provided under the Contract, a designation of whether it is Open Source, Commercial or Customized, as those terms are defined in Article 5.2.1 of the Contract Terms and Conditions, and a list of all applicable software development tools (all software required to operate the software, including operating systems, libraries, tools and utilities, data base structures and code and compilers; to alter/edit the source code; and/or to successfully recompile the software).

Deliverable 5B-8: Two sets of CCTV server installation software, CCTV non-ATMS (Standalone) workstation application installation software, and CCTV intranet web server installation software on read only CD format, two hardcopy bounded sets non-copyrighted installation documentation, and two electronic copies on read only CD format of the installation documentation for all software.

Deliverable 5B-9: Two sets of CCTV server software source code, CCTV non-ATMS (Standalone) workstation application software source code, and CCTV intranet web server software source code on read only CD format, two hardcopy bounded sets non-copyrighted source code documentation, and two electronic copies on read only CD format of the source code documentation for all custom software. Submission of this deliverable is not required prior to MTC SAFE's acceptance of and payment for Deliverables 5A1 through 8.

Deliverable 5B-10: All software licenses. Deliverable shall include a summary table that identifies each type of software furnished, the function it provides in the system, and the associated license number.

Deliverable 5B-11: A draft summary report of the acceptance test results, comments, and descriptions of any and all deficiencies identified during system acceptance testing, the corrective courses of action taken, and the date(s) retesting started, to be reviewed and approved by the Working Group.

Deliverable 5B-12: A final summary report of the acceptance test results, comments, and descriptions of any and all deficiencies identified during system acceptance testing, the corrective courses of action taken, and the date(s) retesting started.

Deliverable 5B-13: A summary report of the operational test results, comments, and descriptions of any and all deficiencies identified during the operational test, the corrective courses of action taken, and the date(s) retesting started.

Contingent on the successful completion of Phase I, Part B, including all deliverables and requirements, the Contract Manager shall issue to the System Integrator a Notice to Proceed to Phase I, Part C.

Phase I, Part C. Full Prototype Interoperability

Task 6 Full Prototype Interoperability with all Field CCTVs

Upon the successful completion of Phase I, Part B and the receipt by Contractor of the Notice to Proceed, the System Integrator shall proceed with the installation, integration, deployment, testing and demonstration of full operability of the prototype CCTV system and GUI, providing seamless access to all (including new and legacy) camera field locations. The System Integrator shall involve CCTV operators in the testing and demonstration and their comments will be provided to the CCTV Working Group.

Deliverable 6C-1: A fully installed, integrated, deployed, tested and demonstrated prototype CCTV system and GUI, providing seamless access to all camera field locations.

Deliverable 6C-2: A summary report documenting all CCTV operator comments.

Disruptions to TMC systems and operations shall be minimized during integration to legacy TMC video systems and may be required to be scheduled during off-peak hours as determined by the Project Manager.

Task 7 Full Prototype Acceptance Testing

a. The System Integrator shall provide system acceptance testing that demonstrates the functionality, stability, and reliability of the system. The stability of the CCTV prototype system shall be such that it maintains a fully operational uptime of 99% with no intervention. All hardware and software shall have a minimum of a 10-year life cycle.

The System Integrator shall furnish proposed acceptance test procedures to the Project Manager for approval that provides for the testing of all system functionality and provides a description of the test methodology for each function. The submitted test procedure shall include an entry for pass or fail of each system function and a field for comments.

Test procedures shall include trying to "break" the system and component security and detecting intrusion attempts.

The System Integrator shall execute acceptance testing after the system has been fully integrated and the test procedures have been reviewed by the CCTV Working Group and approved by the Project Manager. Testing shall be performed under the presence of test representatives as identified by the CCTV Working Group. CCTV operators shall observe the test and their comments and feedback shall be documented in the summary report of the test results. Deficiencies identified during the test shall be documented, corrected and retested by the System Integrator.

b. 30-Day Conditional Acceptance Test. System Integrator shall conduct acceptance testing, following the approved test procedures, for a period of 30 days. In the event of a minor failure during the acceptance testing, the System Integrator shall replace or repair the equipment and the 30-day test acceptance test shall restart only for that piece of equipment.

Suspension of the 30-day acceptance test for the entire system shall occur for the following minor failure conditions:

- Interference with project operations due to vandalism, traffic accident, or power failure.
- Failure to complete the objective of any test scenario due to lack of adequate documentation for equipment supplied by the System Integrator. Failed tests shall be re-tested with revised documentation.
- Intermittent hardware, software, communication, or operation control malfunctions.

Resumption of the test for the remainder of the 30-day period shall occur after satisfactory remedial action. For each restart, the 30-day acceptance test shall be extended by one day after the remediation is complete.

Reinitialization of the 30-day acceptance test shall occur upon major system failure. A major system failure is defined as one or more of the following conditions:

- Failure of any hardware or performance item to meet the operational requirements, identified below, for 72 consecutive hours.
- Failure to correct any problem that adversely impacts the safety of the traveling public, the Engineer, or his representatives within four hours of notification.

c. 90-Day Final Acceptance Testing. Upon successful completion of the system acceptance test, the system will be operationally tested for a 90-day period prior to final acceptance of the Phase I prototype CCTV system. Deficiencies identified during this 90-day period, and concurrent 90-day periods (if necessary), shall be corrected and retested for an additional three-month period. The System Integrator shall involve CCTV

operators in the acceptance testing procedures and their comments and feedback shall be documented in the summary reports in Deliverables 7C, 3 through 6.

Final Acceptance of the Phase I prototype CCTV system shall be obtained (1) after the test results are reviewed by the Working Group; (2) all required training is completed, (3) all documentation and source code has been received and approved by the Project Manager; (4) all other requirements of Final Acceptance in Article 8.2 of the Terms and Conditions have been met; and the Project Manager provides written notification to the System Integrator acknowledging "Final Acceptance of the Phase I prototype CCTV system and all its requirements" with the date Final Acceptance was granted.

The acceptance test results are required to be signed off by the Project Manager. Software licensing and documentation shall be provided to the Contract Manager. Prior to release of the withholding described in Article 3.4.1 of the Contract Terms and Conditions, the System Integrator shall receive written notification from the Project Manager documenting the date system acceptance testing was completed and the date final acceptance was granted by the Project Manager

Deliverable 7C-1: A draft electronic copy of the proposed acceptance test procedures to be reviewed and approved by the CCTV Working Group and the Project Manager.

Deliverable 7C-2: A final electronic and hard copy of the approved acceptance test procedures.

Deliverable 7C-3: A draft summary report of the acceptance test results, comments, and descriptions of any and all deficiencies identified during system acceptance testing, the corrective courses of action taken, and the date(s) retesting started for review and approval of the CCTV Working Group and the Project Manager.

Deliverable 7C-4: A final summary report of the acceptance test results, comments, and descriptions of any and all deficiencies identified during system acceptance testing, the corrective courses of action taken, and the date(s) retesting started.

Deliverable 7C-5: A draft summary report of the operational test results, comments, and descriptions of any and all deficiencies identified during the operational test, the corrective courses of action taken, and the date(s) retesting started for review and approval of the CCTV Working Group and the Project Manager.

Deliverable 7C-6: A final summary report of the operational test results, comments, and descriptions of any and all deficiencies identified during the operational test, the corrective courses of action taken, and the date(s) retesting started.

Deliverable 7C-7: A CD with the final software applications, including system and configuration files.

Deliverable 7C-8: A draft summary report documenting the courses of action resulting from the Phase I, Part B Acceptance Testing and implemented resolution in Phase I, Part C, for review and approval of the Work Group.

Deliverable 7C-9: A final summary report documenting the courses of action resulting from the Phase I, Part B Acceptance Testing and implemented resolution in Phase I, Part C.

Deliverable 7C-10: A complete and fully functional CCTV prototype system meeting all the criteria set forth in the acceptance test as well as all the requirements identified within this scope of services.

Deliverable 7C-11: Detailed final Software Design Review documentation, including all software requirements, detailed software flow charts, a final list of all software to be provided under the Contract, a designation of whether it is Open Source, Commercial or Customized, as those terms are defined in Article 5.2.1 of the Contract Terms and Conditions, and a list of all applicable software development tools (all software required to operate the software, including operating systems, libraries, tools and utilities, data base structures and code and compilers; to alter/edit the source code; and/or to successfully recompile the software).

Deliverable 7C-12: Two sets of CCTV server installation software, CCTV non-ATMS (Standalone) workstation application installation software, and CCTV intranet web server installation software on read only CD format, two hardcopy bounded sets non-copyrighted installation documentation, and two electronic copies on read only CD format of the installation documentation for all software.

Deliverable 7C-13: Two sets of CCTV server software source code, CCTV non-ATMS (Standalone) workstation application software source code, and CCTV intranet web server software source code on read only CD format, two hardcopy bounded sets non-copyrighted source code documentation, and two electronic copies on read only CD format of the source code documentation for all custom software. Submission of this deliverable is not required prior to MTC SAFE's acceptance of and payment for Deliverables 7A1 through 12.

Deliverable 7C-14: All software licenses. Deliverable shall include a summary table that identifies each type of software furnished, the function it provides in the system, and the associated license number.

Task 8 Operational Support

a. Operational Support shall commence with the notification of Final Acceptance and shall last for a period of three (3) years at a fixed price. At the conclusion of the initial three year Operational Support period, Caltrans may extend the Operational Support, at its sole discretion, for four (4) additional consecutive six month periods, at the original

fixed price (pro-rated for a six month period) plus 2% escalation. Caltrans reserves the rights to negotiate with the System Integrator or its support subcontractor for additional extensions, at the conclusion of the potential five (5) years covered by this procurement.

b. Operational Support is system support, as defined herein, supplemental to and not included in the System Integrator's warranty obligations under Article 9 of the Contract Terms and Conditions. The Operational Support shall include technical and maintenance support and coordination with the efforts of Caltrans and its agents to operate a working system.

c. During the Operational Support period, the Project Manager will continue to validate hardware and software furnished under this Contract. The System Integrator shall aid Caltrans in understanding and using the hardware and software furnished, as well as ensuring continued operation and availability of these facilities.

Operational Support shall include furnishing all required test equipment and additional support equipment required to successfully maintain full operation of the Phase I CCTV prototype system components, as well as any additional parts needed during the Operational Support period. All test equipment and support equipment shall become property of Caltrans.

During the Operational Support period, the System Integrator shall provide trained staff to diagnose equipment failure, replace parts and make repairs in accordance with the warranty provisions in Article 9 of the Contract Terms and Conditions (*Appendix H*), and maintain a log of these repairs. As stated in Article 9.5, following notification of failure, repairs shall be made within ten (10) calendar days of the reported failure.

The System Integrator shall provide trained staff to work with Caltrans to understand, use, configure, trouble shoot, diagnose, identify, isolate, and resolve problems and inconsistencies with the System Integrator furnished hardware and software. The System Integrator may suggest providing assistance by telephone. If the Project Manager deems that telephone support is inadequate to resolve the problem at hand, the Project Manager will notify the System Integrator; the System Integrator shall then provide trained staff on site within ten (10) calendar days.

The System Integrator shall install software maintenance updates released by the software suppliers during the Operational Support period; provide patch management to keep up with software fixes; security patches and similar software changes that the various system and component manufactures may recommend or impose over time; and furnish a CD furnished to the Caltrans at no additional cost.

d. The System Integrator shall stock all electronic equipment needed for Operational Support and to meet the Warranty requirements in Article 9 of the Terms and Conditions at a Caltrans location identified by the Project Manager. Unless otherwise arranged, the System Integrator shall stock complete subassemblies at the board or module level to

facilitate rapid repair of this equipment; this equipment shall be kept satisfactorily functioning during the operational support period and shall be fully functional at the end of each operational support period. Battery operated equipment shall include batteries and a battery charger. The System Integrator shall replace any board or card that fails with a board or card from the inventory of support equipment. The System Integrator shall repair or replace the failed units and the support equipment inventory shall be restored to its specified level within ten (10) calendar days.

e. Prior to Final Acceptance, the System Integrator shall submit for approval a list of recommended support equipment (test equipment and spare system equipment/parts) that should be acquired for Operational Support and for the Warranty requirements in Article 9 of the Contract Terms and Conditions. Once approval of the list is obtained, the System Integrator shall furnish and supply the equipment listed within 7 calendar days of Final Acceptance. MTC SAFE may authorize change orders for any unanticipated equipment deemed justified by both the Project and Contract Managers.

System Integrator shall be reimbursed for the direct cost of Support Equipment (not including equipment needed for warranty repairs) with no mark-up. Any labor associated with obtaining and maintaining support equipment, but not including labor to meet the warranty obligations in Article 9 of the Contract Terms and Conditions, shall be included as part of the Operational Support payment in Item 64 of Table 1, *Appendix B*, Summary of Project Budget and Equipment Price List,.

f. The Operational Support payment in Item 64 of table 1, *Appendix B*, Summary of Project Budget and Equipment Price List, will be pro-rated for billing purposes by the month. In addition, direct cost of Support Equipment not including equipment needed for warranty repairs, shall be paid on a monthly basis also. Any repair not completed within ten (10) calendar days of the reported failure will cause the percentage earned by the System Integrator for the month in which the ten (10) day period concludes to be reduced by 5% for each day the failure continues. The reduction shall not exceed 100%.

Contingent on the successful completion of Phase I, Tasks 6 and 7, including all deliverables and requirements, the Contract Manager shall issue to the System Integrator a Notice to Proceed to Phase I, Part D.

Phase I, Part D. Phase II Deployment Plan

Task 9 Develop Phase II Deployment Plan and receipt of a Notice to Proceed

System Integrator shall develop a detailed Deployment Plan for the full District-wide build out of the CCTV system deployed in Phase I, including a schedule for the completion of Phase II work. The Plan shall include a full integration of the Phase I CCTV system to the Caltrans District 4 ATMS.

System Integrator shall submit a draft Phase II Deployment Plan and Preliminary work schedule to the Working Group in sufficient detail to identify all the deliverables contained within the Phase II Scope of Work *(Appendix C)*. The description of the Plan should fully discuss each task, identifying cost and schedule implications, consistent with the level of detail required in the System Integrator's Proposal, as described in Section V.F of the RFP. The Phase II plan needs to be specific about which options in the national standards (NTCIP 1205, 1208, and 1212) are to be implemented. This deals primarily with the ITE/AASHTO Traffic Management Data Dictionary and Message Set (TMDD) standard. TMDD deals with sharing of CCTV camera and video switch status and control. These are critical for achieving multi-vendor interoperability.

The Working Group shall review and discuss the draft Phase II Deployment Plan and the schedule with the System Integrator. The System Integrator shall incorporate all revisions agreed to by the Working Group into the Plan.

After receipt of all Working Group revisions, System Integrator shall submit a Final Phase II Deployment Plan to the Working Group for approval.

No deployment activities shall commence until the Contract Manager and Project Manager have approved the Final Phase II Deployment Plan; any Change Orders to the Contract required to implement the Plan have been executed by the System Integrator and MTC SAFE; and the Contract Manager has issued a Notice to Proceed with the deployment.

Deliverable 9D-1: Draft Phase II Deployment Plan and Preliminary Phase II Project Schedule.

Deliverable 9D-2: Final Phase II Deployment Plan and Final Phase II Project Schedule.

The Final Phase II Deployment & Work Schedule requires approval by the CCTV Working Group.

III. FUNCTIONAL REQUIREMENTS

A. CCTV Communications Network Requirements

The Phase I prototype system CCTV communication network shall provide the system connectivity needed for video distribution and camera controls (i.e. pan-tilt-zoom) to flow between CCTV camera locations and the TMC CCTV monitoring and control platform. This section provides a description of the functional requirements for the communications network elements within the Phase I prototype system, as depicted in **Figure 1**. In this section, the prototype system CCTV communication network requirements have been divided into the following two categories:

1. Telecommunications Media:
   a) ADN direct
   b) ISDN direct
   c) TMC to Hub ISDN
   d) TMC to Hub Ethernet
   e) Wireless Ethernet direct
   f) DSL direct
   g) Frame Relay direct

2. Communications Network Elements:
   a) Video Distribution Server (VDS)
   b) New IP-Video Encoders (IVE)
   c) New IP-Video Decoders (IVD)
   d) New Digital Cross Connect (DCC)
   e) Existing CSU/DSUs
   f) Existing T1 Multiplexer (Channel Bank)
   g) New Ethernet Terminal Server(s)
   h) Existing ADN Video Decoders
   i) Existing ISDN Decoders
   j) State Furnished Ethernet Network Switch
   k) New TMC router
   l) Existing ISDN Terminal Adapters (TAs)
   m) New Bridge/Routers with 56k CSU/DSU
   n) New ISDN Router
   o) Internet Firewall
   p) Internet T1 Router

A.1 Telecommunications Media

The telecommunications media associated with the current Caltrans District 4 CCTV system shall be utilized to support the prototype CCTV deployment. The telecommunications media that is to be used is comprised of two functional groups: Telecommunications links from 1) TMC to a hub and 2) TMC to field devices ("direct"); however, for this discussion the two groups will be further divided by the type of media.

a) **ADN direct:** Fifty-one (51) CCTVs are currently connected in the field by way of ADN lines. The ADN lines are groomed into T1 lines by SBC for connection with the TMC network. Two sites will be included in the prototype system to test both a new and existing camera protocol over IP-encoders. In the TMC, the System Integrator shall provide a new Digital Cross Connect that is required to groom these ADN lines into one of two T1 lines directed at either the TMC router or the existing Static T1 Multiplexer.

b) **ISDN direct:** Three hundred twenty-one (321) CCTVs are currently connected in the field by way of ISDN lines. Two sites will be included in the prototype system to test both a new and existing camera protocol over IP-encoders. Two ISDN lines will be set-aside at the TMC for accessing the ISDN prototype devices. These two ISDN lines at the TMC will be shared by the new IP-encoders that are connected via ISDN direct connections and the new IP-encoders that are connected via "TMC to Hub" ISDN connections. The new System Integrator-provided TMC router shall perform the dial-up function needed for making the ISDN connections to the appropriate IP-encoders. The remaining 319+ existing ISDN direct connections will share the other 14 ISDN lines at the TMC and continue to use the existing ISDN TA at the TMC for establishing the dial-up function.

c) **TMC to Hub ISDN:** The Dumbarton bridge hub and the San Mateo Bridge hub communicate with the TMC over seven and nine ISDN lines respectively. At the Dumbarton Bridge hub, one line will be converted to the IP-based system providing IP video for a predetermined camera location and camera control for all Dumbarton bridge cameras. The remaining ISDN lines will continue to be directly connected to the existing CCTV encoders and shall also remain limited to having predetermined camera locations.
At the San Mateo Bridge Hub, the TA/Decoder architecture for the existing nine ISDN will remain in place.

d) **TMC to Hub Ethernet:** The Walnut Creek Hub currently has 20 cameras connected through a Grass Valley switch that is connected to one T1 encoder. The prototype system will eliminate the CCTV system need for the existing leased T1 line and use the existing fiber optic infrastructure with the existing

SONET WAN nodes and provide new Ethernet uplinks for CCTV connectivity back to the TMC.

The System Integrator shall integrate the CCTV Control Server with the existing Grass Valley video switch for remote control of which three camera locations are to be routed to the new IP-encoders for viewing at the TMC. New Ethernet Terminal Servers shall also be added to the Walnut Creek Hub to provide IP-addressability of all 20-camera control ports.

Note that the Walnut Creek Hub is currently under construction to be relocated at its current site at 1910 Olympic Blvd. in Walnut Creek. The completion date of the relocation is uncertain and therefore the Walnut Creek hub may be unavailable for the prototype deployment. If the Walnut Creek hub is unavailable for the prototype deployment, the System Integrator shall devise an alternate plan to perform CCTV prototype system testing over the SONET based Ethernet WAN and simulate all the new Walnut Creek Hub CCTV prototype system functionality.

e) **Wireless Ethernet direct:** The two cameras that are connected over 802.11 Wireless Ethernet communications shall be upgraded to include new prototype system IP-encoders. One of the cameras shall be upgraded to test new protocol over this style of communication facility and the other on will use the existing Cohu protocol. The System Integrator shall coordinate with the Project Manager to identify the two field location where the wireless equipment will be set-up, develop the schedule on when the System Integrator will need access to this wireless equipment for integration. At the TMC the System integrator shall connect the Ethernet links from the wireless radios to the new TMC router.

f) **DSL direct:** Currently there are no existing DSL direct connections to existing camera locations but there are plans to add DSL lines as part of the CCTV prototype system implementation. The System Integrator shall provide for the integration of DSL sites into the prototype system. The System Integrator shall coordinate with the Project Manager to identify the two field locations where the DSL equipment will be set-up, develop the schedule on when the System Integrator will need access to this DSL equipment for integration. At the TMC the System integrator shall install the necessary DSL modem interface ports on the new TMC router.

g) **Frame Relay direct:** Currently there are no existing Frame Relay direct connections to existing camera locations and there are no plans to add Frame Relay lines as part of the CCTV prototype system implementation; however, it is currently envisioned that Caltrans will add some Frame Relay direct connections to the system at some point in the future. The System Integrator shall keep this in mind when designing the CCTV prototype system and shall

document how future Frame Relay direct connections are to be added to the system in the future.

A.2 Communications network Elements

The prototype system communication network elements shall provide the system connectivity needed at the TMC for video routing and camera controls to flow between CCTV field devices and the TMC CCTV monitoring and control platform, which then processes the information automatically as well as under the guidance of the system operators. Because the communications network for connection to the field device locations is predominantly through a limited number of leased lines at the TMC, the TMC CCTV monitoring and control platform shall be integrated with many of the communications network elements to provide operator and administer control over these limited resources.

ITEM A.2.1 - Video Distribution Server (VDS): The primary function of the VDS is to collect digital video streams (MPEG4 and H.263/H.323 standards) from prototype field CCTV locations as well as those used in the TMC for conversion of all other CCTV video feeds. The VDS shall be one or more servers capable of managing and receiving up to 800 video streams from CCTV IP-encoders and re-distributing these digital video streams in real-time to at least 200 destination (i.e. 200 simultaneous outgoing streams) workstations, decoders, or other devices compatible with industry standard digital video players such as Windows Media Player™, Real Player™, Darwin/QuickTime™, or an approved equivalent. The VDS shall be compatible with all System Integrator-provided MPEG-4 and H/263/H.323 standards-based IP-encoders and capable of receiving IP packet streams and decoding both MPEG-4 and H/263/H.323 digital video streams from each of the different encoder manufacturers. Because video encoding will be performed by the IP-encoders, described elsewhere, the VDS will largely perform a “relay” distribution function rather than video capture and trans-coding function.

Because some circumstances will require a particular video stream to be restricted to viewing by operators in the TMC, the VDS shall support the ability to restrict designated users or groups of users from accessing designated videos on demand.

Initially, field IP-encoders will be configured for unicast operation and will be preset to transmit all video directly to the VDS for re-distribution. The ultimate configuration for the District 4 TMC will include a redundant VDS, whereby remote CCTV video will be multicast to allow for either VDS to receive and re-distribute video. The VDS system shall be capable of managing both unicast and multicast video streams coming in, and unicast and multicast of outgoing video streams. Licensing fees, if any, shall be included in the cost of the VDS to provide unlimited streaming bandwidth capacity in support of the required number of incoming and outgoing streams. No licensing fees will be allowed for video player software at the display devices. Video distribution will not be

limited to just users/operators on the Caltrans intranet and may ultimately be shared with the public via the Internet.

The VDS hardware shall be comprised of the following minimum requirements including:

- Dual (two) Xeon™ processors operating at 3.2GHz or better;
- 4 GB of RAM;
- RAID5-compliant storage disk array with 146 GB of useable capacity;
- One or more Gigabit Ethernet interfaces and one or more 10/100Mbps Ethernet interfaces; both shall be physically and logically compatible with the System Integrator provided network switch;
- Redundant power supply and cooling fans;
- Latest version of recommended operating system platform (e.g. 2000/XP Professional, IRIX, UNIX, etc);
- CD-RW/DVD- drives; and
- Three-year warranty and on-site support (four hour response time).

Pursuant to Task 3e, copies of the Caltrans' Standard Plans and the Special Provisions which detail the specifications of existing equipment manufacturers and model numbers currently being used in the Caltrans District 4 CCTV system will be furnished to the System Integrators upon request..

The VDS shall be connected to the new (part of this project) Caltrans District 4 CCTV Ethernet Video LAN, which provides the conduit for receiving and re-distributing digital video streams. The CCTV Control Server, described elsewhere, will issue commands to the VDS, which shall cause the image generated by one of the currently connected CCTV devices to be multicast and displayed on the selected display devices. Display devices include Operator Workstations, as well as analog video displays connected to IP-decoders.

Measurement and Payment:

The VDS shall be measured as each unit furnished, installed, configured and tested as a fully functional and integrated system component with all associated video streaming management/viewing software. Payment shall be considered full compensation for all associated hardware, software, accessories, integration and configuration services, materials and labor required.

ITEM A.2.2 - IP-Video Encoders (IVEs): IVEs shall convert analog video into a digitally compressed signal that is subsequently packetized for IP transmission across an Ethernet local and wide area network (LAN/WAN). IVEs shall also include a serial data port for interfacing with command/control equipment such as a camera control unit (CCU) or digital signal processing (DSP) cameras. The serial data port shall be addressable via an Ethernet address associated with the IVE (e.g., terminal server

functionality). The Camera Control Commands shall be sent to the serial port "in-band" through the IP connection. The data port shall provide a transparent path between any camera command and control software and the attached camera device (i.e. no additional/proprietary protocol translation).

The prototype CCTV system shall employ and test two video encoding algorithms: MPEG 4 and H.263/H.323. The system is intended to provide Caltrans District 4 with a means of comparing multiple IVE manufacturers from a quality and performance standpoint as well as inter-operability. At least four IVE manufacturers shall be used in the prototype system, and at least two shall be supplied for each encoding algorithm. IVEs that utilize these two encoding algorithms shall be deployed across the various communication techniques employed by Caltrans (ADN, ISDN, Ethernet) such that performance testing of these devices can be documented for each installation type. IVEs for this prototype system shall be installed as indicated in the **Figure 1** for the prototype system

Several IVEs will be located in field cabinets that warrant the ability to withstand the heat, cold, and humidity constraints of an outdoor system. At these locations, the System Integrator's design shall provide rugged field equipment that is in accordance with Caltrans environmental requirement. In locations where multiple analog CCTV videos are to be encoded (i.e. Walnut Creek Hub and the TMC), the IVE processor shall be capable of performing the conversion of multiple analog NTSC video into separate MPEG4 or H/263/H.323 digital streams. Regardless of the approach to encode the NTSC video and convert this data to an Ethernet data stream, it is required that two separate encoding scenarios be tested. The System Integrator shall document an interconnection scenario that includes a high-level description of the use and testing of both encoding algorithms based upon the designed placement of the System Integrator supplied IVE equipment. Design documentation shall indicate the IVEs ability to adapt to each of the communication methods employed by Caltrans District 4, including available control methods for changing the digital video encoding resolution, image size, and frames per second. This documentation shall be supplied to the Engineer for approval.

Electrical power requirements for all new equipment, including surge suppression of transient voltage spikes due to the addition of air conditioning, shall be documented and shall be met for each equipment configuration.

Existing equipment cabinet size and proposed new equipment layout shall also be a part of the design. A design drawing showing the size of the existing cabinets and proposed equipment placement within cabinets, all included electronic equipment, any required environmental devices, all power disconnection, the size and weight of each component including the encoder unit shall be provided to properly assess the design of typical installation scenarios.

Encoders shall operate in the existing field topologies, which include distances of up to 850 feet from the CCTV to the cabinet (encoder location). Encoders shall have remote

diagnostic capabilities (from TMC) and locally in field cabinet. The System integrator shall provide all IVE manufacturers' recommended hardware options such as lightning arrestors and multiplex devices for use with multiple input IVEs.

Measurement and Payment:

The IVE shall be measured as each unit furnished, installed, configured and tested as a fully functional and integrated system component. IVE devices that provide multiple NTSC inputs and multiple digital video outputs shall be considered as multiple IVE units and the number of units measured shall be equal to the number of NTSC video ports connected to the system. Payment shall be considered full compensation for all associated hardware, software, accessories, integration and configuration services, materials and labor required.

ITEM A.2.3 - IP-Video Decoders (IVDs): IVDs shall convert digitally compressed video streams from the IVEs and the VDS back into analog NTSC form. IP-decoders provide an input to non-computerized analog video display monitors in the equipment room, lobby, ERC, and the visitor center, by way of existing 4-channel analog video optical multiplexers.

The IVD shall be capable of decoding IP-encapsulated MPEG 4 and H/263/H.323 video algorithms from the proposed encoders and shall be compatible with the VDS streaming software. Decoding software capabilities should be seamless between all provided types of IVEs and shall be able to automatically determine how to decode the incoming encoding algorithm.

The prototype CCTV system shall test the interconnectivity between IVEs and IVDs of different manufacturers with the VDS as a relay server. A minimum of two types/manufacturers of IVD shall be tested in the prototype CCTV system using MPEG 4 and H/263/H.323 encoding algorithms.

The System Integrator shall provide two types of IVDs in the prototype system for proof testing. The first type shall be a standalone unit capable of decoding one digital stream to NTSC analog video and the second type shall be comprised of a single computer or IVD processor with a remotely-controllable media player that is capable of performing the conversion of multiple digital MPEG4 H/263/H.323 streams to multiple separate analog NTSC videos. Regardless of the approach to decode the video, it is required that two separate decoding algorithms be tested. The System Integrator shall establish the two interconnection scenarios and shall provide this documentation to the Project Manager for approval.

Decoding software capabilities should be seamless between the two proposed IVE algorithms and shall be able to automatically determine how to decode the desired video stream.

The proposed equipment shall be designed for rack mounting in a conventional 19" rack space provided at the TMC (rack provided by others).
All electrical and environmental requirements of this equipment shall be accounted for in the design of the proposed decoder station as shown in Figure 1 of the proposed prototype system.

Measurement and Payment:

The IVD shall be measured as each unit furnished, installed, configured and tested as a fully functional and integrated system component. IVD devices that provide multiple NTSC inputs and multiple digital video inputs shall be considered as multiple IVD units and the number of units measured shall be equal to the number of NTSC video ports connected to the system. Payment shall be considered full compensation for all associated hardware, software, accessories, integration and configuration services, materials and labor required.

ITEM A.2.4 - Digital Cross Connect (DCC): The Digital Cross Connect (DCC) is used to groom multiple incoming T1 channels down to one or more T1s. Each T1 can carry up to 24 DS-0 data subchannels. Currently, seven incoming T1 lines are connected to the DCC. The DS-0s on these seven T1 lines are then dynamically groomed onto one T1 line connected to the T1 Channel Bank.

The existing DCC is at capacity and cannot accommodate the additional T1 needed for connection to the TMC router. The prototype system shall include a new DCC to replace the existing DCC and provide a minimum of 12 T1 channels with capability to expand to 24 T1s. The new DCC shall have the capability to groom DS-0s from all incoming T1s to any channel on the outgoing T1s to the Channel Bank and the TMC router. Initially the DCC will be required to cross connect any of the 168 DS-0s (7x24) to the 24 available channels destined for the T1 Multiplexer channel bank. A second output T1 is proposed for connection with the TMC router, which would allow dedicated access to the two ADN prototype camera sites. An EIA-232 port, or an approved equivalent, shall be provided for connection to the terminal server and integrated with the TMC CCTV monitoring and control platform for dynamically controlling DS-0 grooming, which in turn determines what ADN cameras will be connected at any given time. The DCC shall use a published application interface (API) for open integration with the central platform. Two copies of the API documentation shall be provided. The DCC shall be compliant with ANSI T1.403 and T1.107.

Measurement and Payment:

The DCC shall be measured as each unit furnished, installed, configured and tested as a fully functional and integrated system component. Payment shall be considered full compensation for all associated hardware, software, accessories, integration and configuration services, materials and labor required.

ITEM A.2.5 - Existing CSU/DSUs: The existing CSU/DSUs terminate and re-condition the incoming telecommunication lines prior to connection with data terminal equipment (e.g. Encoders, Decoders, etc.). The existing CSU/DSUs have two data ports: one for video from/to encoders/decoders, and one for communicating between camera control units (CCUs) and the central monitoring and control platform. The CSU/DSUs at the TMC shall route the secondary port to the new terminal server where camera control messages can be managed.

Measurement and Payment:

Integrating the new prototype system to the existing CSU/DSU devices will not be measured or paid. Cost of such work shall be considered included in the unit costs of other items being measured and paid.

ITEM A.2.6 - Existing T1 Multiplexer (Channel Bank): The existing T1 channel bank provides 24 data channels multiplexed/demultiplexed from a T1 channel. The channel bank demultiplexes the T1, provided by the new Digital Cross Connect, back into 24 56k data lines. The prototype system shall use 14 of these circuits for connection with existing GPT-GVS10 ADN video decoders.

Measurement and Payment:

Integrating the new prototype system to the existing T1 Multiplexer (Channel Bank) will not be measured or paid. Cost of such work shall be considered included in the unit costs of other items being measured and paid.

ITEM A.2.7 - Ethernet Terminal Server(s): The terminal server provides the EIA-232 connectivity between the Ethernet LAN and the devices that require serial interfaces. The terminal server packages the EIA-232 channels onto a standard Ethernet channel for transmission to the CCTV central monitoring and control platform. The new terminal servers provided by the System Integrator in the TMC “new equipment room” shall be used for the following Ethernet-to-serial device interface functions:

- Connectivity to the existing CSU/DSUs for camera control data to the CCTV locations that will continue to use the existing ADN Direct telecommunications medium approach;
- Connectivity to the existing Enerdyne decoders for camera control data to the CCTV locations that will continue to use the existing ISDN Direct and the existing ISDN TMC-to-Hub telecommunications media approaches;
- Connectivity to the Digital Cross Connect for cross connect controls from the central monitoring and control platform; and
- Connectivity to the Existing ISDN TAs for passing software Hayes “AT” dialing commands from the central monitoring and control platform.

The terminal servers provided by the System Integrator at the field hub locations shall be used to provide Ethernet-to-serial device connectivity to the existing Video Optical Transceivers (VOTR) for camera control data communications.

All terminal servers provided shall support a minimum of 16 serial ports.

Measurement and Payment:

The Ethernet terminal servers shall be measured as each unit furnished, installed, configured and tested as a fully functional and integrated system component. Payment shall be considered full compensation for all associated hardware, software, accessories, integration and configuration services, materials and labor required.

Item A.2.8 - Existing ADN Video Decoders: The 14 existing ADN decoders will continue to serve the 51+/- field sites that will remain on the existing architecture. The existing decoders will convert the non-standard digital video stream back into analog NTSC form prior to connection with an IP-encoder and video switch at the TMC. Camera controls are routed through the secondary port on the CSU/DSU with this architecture.

Measurement and Payment:

Integrating the new prototype system to the existing ADN video decoders will not be measured or paid. Cost of such work shall be considered included in the unit costs of other items being measured and paid.

ITEM A.2.9 - Existing ISDN Decoders: Similar to the existing ADN decoders, the existing non-standard ISDN decoders will continue to serve the 279+ field sites that will remain connected using the existing ISDN direct and ISDN TMC-to-Hub telecommunication media approaches. The existing decoders will convert the compressed digital video stream back into analog prior to connection with an IP-encoder and video switch at the TMC. Camera controls are routed through the existing ISDN decoders with this architecture.

Measurement and Payment:

Integrating the new prototype system to the existing ISDN decoders will not be measured or paid. Cost of such work shall be considered included in the unit costs of other items being measured and paid.

ITEM A.2.10 - Ethernet Network Switch: The new network switch shall provide the Ethernet interconnections that are necessary for all dedicated Ethernet segments, shared workgroup Ethernet segments, and Ethernet segments virtually extended from remote locations and within the TMC. The network switch also provides the mechanism for distributing IP-encoded video to workstations and IP-decoders. The network switch shall

be provided and configured by the System Integrator with logical VLAN working groups to provide separation between critical CCTV monitoring and control platform communication resource management traffic, operator workstation interface traffic, TMC to CCTV field location camera control traffic, and other logical working groups identified by the System Integrator and approved by the Project Manager. The new network switch shall be provided with network management software needed to manage the new CCTV LAN and support SNMP/RMON communications with all system network devices that support SNMP/RMON data transactions.

The System Integrator's CCTV prototype system design/engineering efforts shall include identifying all new physical and logical connectivity requirements needed for the new network switch. The System Integrator shall provide any additional network switch interface cards and software needed for the Ethernet network switch to complete the functional requirements of the video LAN.

Under the direct supervision of the Project Manager, the System Integrator shall be responsible for installing all network switch components. The System Integrator shall also be responsible for providing all necessary network switch logical configurations needed to support the prototype system and maintain the existing functionality of the other network switch connections to existing components that will remain in place and become part of the new system.

The TMC Switch shall be compatible with existing network equipment and conform to Caltrans' IT requirements. The System Integrator shall submit for approval a complete set of specifications to the Project Manager prior to purchasing and installing equipment.

Measurement and Payment:

The Ethernet network switch shall be measured as each unit furnished, installed, configured and tested as a fully functional and integrated system component. Payment shall be considered full compensation for all associated hardware, software, accessories, integration and configuration services, materials and labor required.

ITEM A.2.11 - TMC Router: The System Integrator shall provide a TMC router to support all necessary communications routing management functions and Ethernet bridging functions (i.e. T1 Frame Relay, DSL and ISDN wide area network (WAN) protocols). The TMC router shall be configured with sufficient Ethernet ports and firewall software to facilitate secured connectivity to the DSL and wireless Ethernet modems. The TMC router shall also be provided with a minimum of four expansion slots that can be configured for future Frame Relay, and T1 PRI communications services. The TMC router shall be configured to provide an Ethernet LAN virtually extended through 56k sub-channels on a T1 for connecting prototype camera sites via ADN lines and twenty (two for prototype system use and 18 spare for future use) dial-up ISDN lines for connecting prototype camera systems directly or through field hubs via ISDN lines. The router shall be equipped with the routing firmware/software necessary to administer

telephone numbers for each of the dial-up camera locations. The router shall also be equipped with the routing firmware/software necessary for future support of T1 PRI and frame relay telecommunications media.

Existing communications media for the CCTV System in the TMC includes seven T1 lines, 16 ISDN, two links to the DSL modems and two links to the wireless Ethernet modems.

The TMC Router shall be compatible with existing network equipment and conform to Caltrans' IT requirements. The System Integrator shall submit for approval a complete set of specifications to the Project Manager prior to purchasing and installing equipment.

Measurement and Payment:

The TMC Router shall be measured as each unit furnished, installed, configured and tested as a fully functional and integrated system component. Payment shall be considered full compensation for all associated hardware, software, accessories, integration and configuration services, materials and labor required.

ITEM A.2.12 - Existing ISDN Terminal Adapters (TAs): The ISDN terminal adapters are, in essence, modems for ISDN lines. Two of the TMC TAs will be replaced in function by the TMC router. The remaining 14 ISDN TAs will remain intact for communicating with the existing architecture sites (e.g., 279+/- field sites, two at Dumbarton Bridge, and four at San Mateo). The ISDN TAs come equipped with a maintenance port that can be, and is proposed to be, used for issuing dialing commands from the CCTV Control Server via the terminal server to control which remote camera is connected to each of the 14 TMC TAs.

Measurement and Payment:

Integrating the new prototype system to the existing ISDN terminal adapters will not be measured or paid. Cost of such work shall be considered included in the unit costs of other items being measured and paid.

ITEM A.2.13 – Bridge/Routers with 56k CSU/DSU: The bridge/routers with 56k CSU/DSU provide the buffering, bridging and communication handling functions needed between the field end IP-encoders and the leased ADN links.

Measurement and Payment:

The bridge/routers with 56k CSU/DSU shall be measured as each unit furnished, installed, configured and tested as a fully functional and integrated system component. Payment shall be considered full compensation for all associated hardware, software, accessories, integration and configuration services, materials and labor required.

ITEM A.2.14 – ISDN Routers: The ISDN routers provide the buffering, bridging and communication handling functions needed between the field end IP-encoders and the leased ISDN links.

Measurement and Payment:

The ISDN routers shall be measured as each unit furnished, installed, configured and tested as a fully functional and integrated system component. Payment shall be considered full compensation for all associated hardware, software, accessories, integration and configuration services, materials and labor required.

ITEM A.2.15 – Internet Firewall: The Internet firewall shall provide IP routing, Virtual Private Network (VPN) secured tunnels through the internet, and function as a packet firewall. With the Internet firewall remote users shall be able to achieve secured intranet access to the CCTV LAN at the TMC for performing remote operations and administration functions provided by the intranet web server GUI.

The firewall shall provide network protection through an Internet appliance (hardware). The firewall shall provide limits to access to/from internal networks by determining, through a security policies, which inside services (http, ftp, email, etc) are permitted access from the outside, and vice versa. The network firewall shall provide a logical barrier, in conjunction with the Internet T1 Router, between internal and external networks (e.g. the Internet). The firewall shall include support for IP Security (IPsec) protocol for encryption, authentication (public key and private key), and confidentiality. The firewall shall also provide DES and 3DES encryption and native support for VPN. Proposed VPN authentication keys and access methods shall be submitted to the Engineer for approval.

The firewall shall provide network address translation (NAT) and public address translation (PAT) to prevent internal network element IP addressing from being identified by anonymous users via the Internet. The firewall shall provide logging capability, especially for tracking activities, applications, and users by time of day and by IP address. The firewall shall provide the capability to send e-mail or dial a designated pager when pre-defined security-breach conditions occur.

The firewall shall provide at a minimum: one Fast Ethernet port for connection to the Internet T-1 Router (outside), one Fast Ethernet port for connection to the internal network (inside), and four Fast Ethernet ports for connection to equipment in a de-militarized zone (DMZ). The System Integrator shall submit a proposed IP addressing schema for approval prior to completing configuration of the firewall. The security policy configuration shall also be submitted for approval prior to completing the connection to the Internet T1 router. The policy shall only provide access to the required applications at the TMC; all other functions/applications shall be disabled. Administrator passwords and an electronic copy of the final firewall policies/settings shall be submitted to the Engineer for verification prior to activating the firewall.

The Internet Firewall shall be compatible with existing network equipment and conform to Caltrans' IT requirements. The System Integrator shall submit for approval a complete set of specifications to the Project Manager prior to purchasing and installing equipment.

Measurement and Payment:

The Internet Firewall shall be measured as each unit furnished, installed, configured and tested as a fully functional and integrated system component. Payment shall be considered full compensation for all associated hardware, software, documentation, accessories, integration and configuration services, materials and labor required.

ITEM A.2.16 – Internet T1 Router: The internet T1 router shall provide the bridging function needed between the new leased T1 line (connected to the internet) coming into the TMC and the Ethernet interface to the firewall at the TMC.

The Internet T1 router shall provide interconnection between the Internet (via T1(s)) and local area networks (LANs) at the TMC. The functions of the router shall be to:

- Provide physical and link layer protocol compatibility for bridging.
- Provide protocol and signal compatibility at the network layer for routing.
- Support multilink bonding of multiple T1 links (e.g. MLPPP) to form a single aggregate data channel between the router and the Internet.
- Incorporate TCP/IP and UDP/IP, supporting network routing and bridging.
- Buffer data as required to accommodate input/output data rates without loss of data and without causing transfer delays.
- Transparently manage lower level protocols.
- Accommodate full-duplex data transmissions on all attached T1 interfaces.
- Conduct built-in test and report failures via alarms and indicators.

The Internet T1 router shall include a minimum of two T1 interfaces and at least four 10/100Mbps auto-sensing switched Fast Ethernet ports. Each router shall be equipped with internal or external CSU/DSUs for direct termination of the Internet provider T1 circuits.

All software/firmware required to operate and update network configuration/routing, and to maintain the router shall be provided with the equipment. If the Internet T1 router requires loadable software for either operations or maintenance, the software shall be provided on a magnetic media compatible with the delivered equipment. As with the firewall, the System Integrator shall submit a proposed IP addressing schema for approval prior to completing configuration of the router. Administrator passwords and an electronic copy of the final router policies/settings shall be submitted to the Project Manager for verification prior to connecting the router to the Internet.

The Internet T1 Router shall be compatible with existing network equipment and conform to Caltrans' IT requirements. The System Integrator shall submit for approval a complete set of specifications to the Project Manager prior to purchasing and installing equipment.

Measurement and Payment:

The Internet T1 router shall be measured as each unit furnished, installed, configured and tested as a fully functional and integrated system component. Payment shall be considered full compensation for all associated hardware, software, accessories, integration and configuration services, materials and labor required.

B. CCTV Camera Assemblies

The System Integrator shall replace three of the existing CCTV camera assemblies (camera with zoom lens, camera enclosure, pan/tilt unit, CCTV pole mounts, and the camera control unit) with three new CCTV camera assemblies. The exact locations of the three CCTV field sites that will have the new CCTV camera assemblies installed shall be coordinated with the Project Manager and each of the three locations shall utilize a different telecommunications Media approach as depicted in **Figure 1**.

ITEM B.1.1 – CCTV Camera Assemblies: The following three types of new CCTV camera assemblies shall be provided by the System Integrator:

- COHU 3950 Series integrated solution for camera, positioner, and control using a high performance DSP camera in a 3.5" sealed and pressurized housing, high speed positioner (pan/tilt unit), and sunshield. The current model number for this integrated camera assembly is 3955-39-POLE and it shall use the COHU version of the NTCIP protocol.
- COHU 3920 Series i-dome integrated camera and pan/tilt/zoom assembly and shall use the latest published standard Cohu protocol.
- RVision SEETM 820017 integrated camera and pan/tilt/zoom assembly using Enhanced VISCATM protocol.

The System Integrator shall provide all mounting hardware, cabling, and accessories needed to mount the camera assemblies to the existing CCTV poles and connect the camera assemblies to the new IP-encoders at these three locations. The System Integrator shall integrate all three new camera protocols into the new TMC CCTV monitoring and control platform and any other necessary integration efforts needed to provide a completely integrated and functional CCTV camera assembly at these three locations.

The System Integrator shall coordinate with the Project Manager to identify the exact CCTV field locations that will be used for the prototype system. One of these locations shall be at a CCTV location where the distance between the camera and the camera is over 800 feet.

Measurement and Payment:

The CCTV camera assemblies shall be measured as each unit furnished, installed, configured and tested as a fully functional and integrated system component. Payment shall be considered full compensation for all associated hardware, software, accessories, integration and configuration services, materials and labor required.

ITEM B.1.2 – Existing CCTV Camera Assemblies: All existing CCTV camera assemblies shall be integrated into the new system.

Measurement and Payment:

Integrating the existing CCTV camera assemblies will not be measured or paid. Cost of such work shall be considered included in the unit costs of other items being measured and paid.

C. Software Functional Requirements

Software shall be provided to manage resources, control CCTV devices, and route images to selected display devices. The software shall support a hybrid communication network as depicted in **Figure 1**. Elements of this software shall reside on Operator Workstations, the CCTV Control Server, and the Intranet Web Server.

The following diagram depicts the software control elements that shall be used to manage communication resources, control camera assembly devices, and route video images to video display devices.

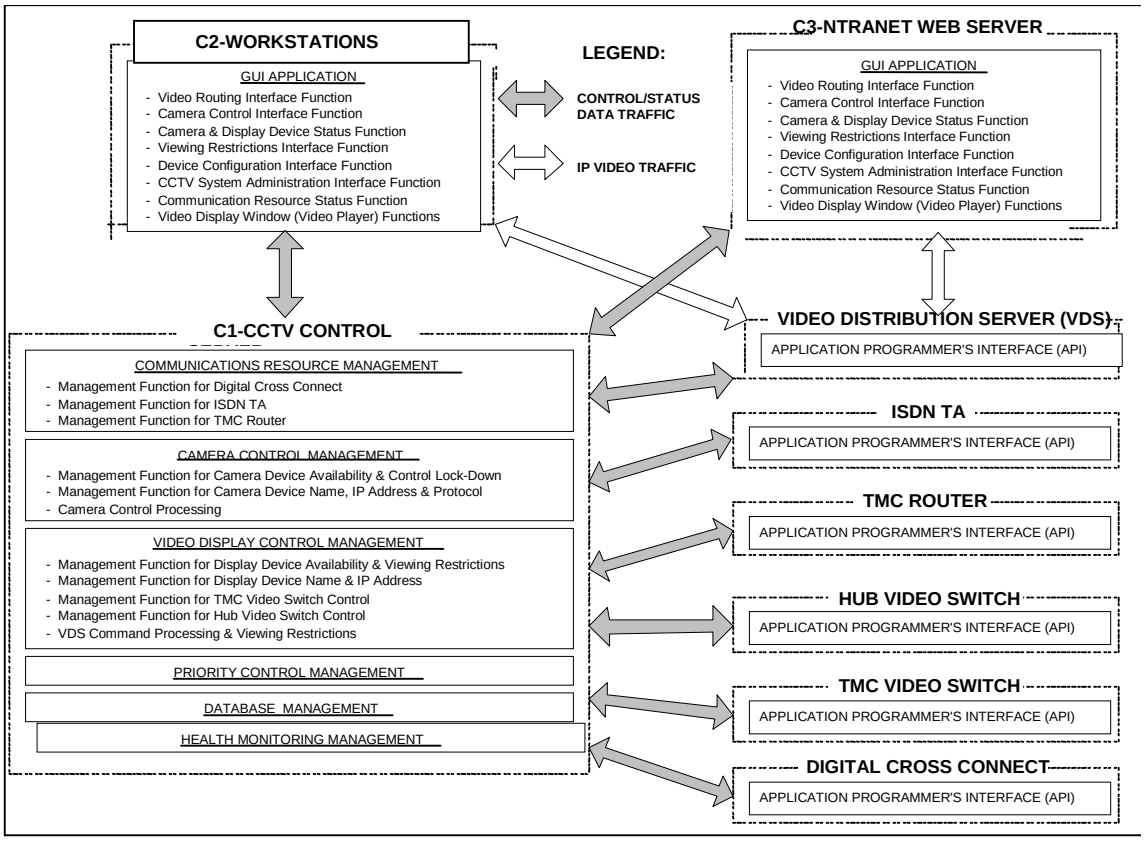

Figure 4: TMC CCTV Monitoring and Control Platform

In addition to the functional requirements described in this section, the software shall meet the following general requirements:

- The software shall operate on COTS PC hardware running the latest release of Windows™ operating system at the time the system is delivered or a Project Manager approved alternative.
- All software modules shall be provided on an installation CD that automates the installation process to the extent practicable.
- The system software shall be provided with an Operator's (User) Manual, Maintenance (Administrator) Manual, source code, and source code documentation. The Operator's manual shall provide sufficient information to allow a trained operator to manage the system during normal operation. The Maintenance Manual shall provide system trouble shooting and software installation procedures. The installation procedures shall be sufficiently detailed to allow a technician to configure and install a newly purchased Operator Workstation or CCTV Control Server.

C.1 CCTV Control Server

a) Communications Resource Management: All communication resource commands shall originate at the Operator Workstation and shall be monitored and processed by the CCTV Control Server. The CCTV Control Server shall manage communication resource commands from multiple workstations and the intranet web server simultaneously. The CCTV control function shall monitor the status and availability of communication resources to prevent conflicts among multiple users trying to use the same communication resources.

The functionality related to each control element used to manage communication resources is described below.

1. Management Function for the Digital Cross Connect

For the purpose of routing video and camera control data from devices connected via ADN media, the CCTV control function shall issue RS232 commands to the Digital Cross Connect device through the Terminal Server. The command shall cause the requested ADN camera input channel to be connected to one of the 14 available output channels leading to the T1 MUX. The management function for the digital cross connect shall also keep track of which camera is connected via the T1 MUX and route the camera controls via the terminal server to the corresponding CSU/DSU in the TMC.

2. Management Function for the ISDN TA

The CCTV Control Server shall issue RS232 commands through the Terminal Server to one of the available ISDN TA devices. The command shall cause the ISDN TA to establish a dial-up connection to the requested CCTV device. This connection shall establish the return of video to the VDS and the TMC Video Switch, and allow subsequent CCTV control commands to be properly routed via the terminal server to the corresponding decoder in the TMC. Cameras connected to the Dunbarton Bridge Hub shall receive CCTV control commands via the terminal server at this location and cameras connected to the San Mateo Bridge Hub will continue to have no CCTV control at the end of this prototype phase.

3. Management Function for the TMC Router

The CCTV Control Server shall issue commands to the TMC router over the Ethernet LAN. The command shall cause the TMC router to establish a dial-up connection through one of two available ISDN BRI ports to the requested CCTV device. This connection shall establish the return of video from the requested device to the VDS and allow subsequent CCTV camera control commands to be properly routed to the corresponding field IP-encoder or to the corresponding Video Optical Receiver (VOR) via the appropriate Hub terminal server.

b) Camera Control Management: All camera control commands shall originate at the operator workstation (or intranet web server) and be processed by the CCTV Control Server. The CCTV Control Server shall coordinate/manage camera control functions from multiple workstations (and the intranet web server) as well as activating the multicasting of video streams after successful connection to camera locations. The CCTV Control Server shall monitor the status and availability of CCTV cameras to prevent multiple users from controlling the same camera concurrently. The CCTV Control Server shall provide the operator workstations and intranet web server with real-time information on CCTV status, current users, and their priority levels.

Based on the existence of a connection between the TMC and a camera device, and subject to the capabilities of the camera device, the camera control management function shall support the following CCTV controls:

- Pan Left/Right;
- Tilt Up/Down;
- Zoom In/Out;
- Iris Open/Close/Auto;
- Focus In/Out;
- Send camera ID text to camera device ID generator for insertion over video image; and
- Control Over-ride – Users with a higher priority level shall be capable of taking control and/or able to disconnect a CCTV from a user with a lower priority level.

The CCTV Control software shall support the configuration and selection of 64 camera-preset positions for each camera. Each defined preset shall have a text field associated with it that shall be superimposed on the video image upon selection of the preset.

The CCTV Control Server shall support the following CCTV protocols:

- Current unique version of Cohu protocol in District 4;
- Cohu's latest published standard protocol supplied with the 3920 Series i-dome;
- Cohu NTCIP protocol supplied with the 3950 series integrated camera solution; and
- RVision (see www.drayvision.com) Enhanced VISCA™ protocol supplied with their SEE™ 820017 pan/tilt/zoom camera assembly.

The camera control management function shall be designed not to preclude the addition of support for a minimum of 20 additional protocols in the future.

The CCTV control function shall utilize the following communication pathways to propagate camera control commands.

- RS232 commands through the Terminal Server to any of the 14 connected ADN camera/CCU devices. (Note the amount ADN

"Direct" connect cameras are limited by the number of TMC connected CSU/DSU devices);

- IP commands through the TMC router to either of two IP-addressable ADN "Direct" connect camera/CCU devices;
- RS232 commands through the Terminal Server to any of the 14 connected ISDN camera/CCU devices. (Note the amount ISDN "Direct" connect cameras are limited by the number of TMC connected ISDN TA devices);
- IP commands through the TMC router to any of two IP-addressed ISDN "Direct" connect camera/CCU devices;
- IP commands through the TMC router and Hub terminal servers for any of the 27 IP-addressed camera/CCU devices connected via the Dumbarton Bridge Hub and Walnut Creek Hub; and
- IP commands through the TMC router to any of two IP-addressed Wireless Ethernet "Direct" connect camera/CCU devices.

c) Video Display Control Management: All video display commands shall originate at the Operator Workstation (or intranet web server) and be processed by the video display control management function. Video display commands shall cause camera images that are currently connected to the TMC to be multicasted and displayed on the requesting workstation monitor (or remote PC at the other end of the intranet web link) and on alternate video display devices if so desired by the operator. The video display control management function shall manage video display commands from multiple workstations and the intranet web server. The video display control management function shall monitor the status and availability of video display devices to prevent conflicts among multiple users trying to display different images on the same video display device. The Video Control Management Function shall provide the operator workstations and the intranet web server with real-time information on display status, current users, and their priority levels.

Note that operator workstations and remote PCs at the other end of the intranet web link are devices that shall be capable of accepting and receiving four or more simultaneous video feeds from different camera sources.

The video display control system shall monitor the time a connected user has been inactive. After a preset time determined by the administrator, the display control system shall hang up all calls initiated by inactive users. The system shall notify affected users.

1. Viewing Restrictions

The CCTV Control Server shall allow for viewing restrictions by locking camera images from being viewed by selected operators. The lock shall cause all shared communication resources associated with the camera video connection to be marked as unavailable to unauthorized operators. The lock shall be activated and deactivated by commands initiated at operator workstations and remote PCs at the other end of the intranet web link. The 'lock out' feature shall be based on a

hierarchal priority level set by the system administrator for each user. Users with a higher priority level shall have the ability to lock out those with a lower priority level from routing a camera image to a locked display device.

2. IP Video Routing

The CCTV Control Server shall issue commands to the VDS over the Ethernet LAN. The command shall cause the image generated by one of the currently connected CCTV devices to be multicast and displayed on the requesting workstation computer (or remote PCs at the other end of the intranet web link) monitor and on any other selected display device. A camera image of a specific camera location shall be displayed by default on the requesting workstation computer (or remote PCs at the other end of the intranet web link) monitor when the corresponding camera icon is selected from the associated application GUI.

3. NTSC Video Routing via the TMC Video Switch

The CCTV Control Server shall issue commands to the (AutoPatch) TMC Video Switch over the Ethernet LAN. The command shall cause the image generated by one of the currently connected cameras to be displayed on the selected display device as requested. Supported display devices shall include those located in the following areas:

- Old Equipment Room
- Lobby
- Emergency Response Center
- Visitor Center
- Auditorium
- TravInfo Control Room

4. NTSC Video Routing via the Hub Video Switch

The CCTV Control Server shall issue commands to the Video Switch located at the Walnut Creek Bridge Hub via Ethernet over SONET WAN. The command shall cause the video switch to route the selected video image from camera location to one of the available IP-encoders for video transmitting back to the VDS. CCTV control server hub video switch control application shall support additional hub video switches from different manufacturers and shall be provided with an API to facilitate these future integration efforts.

d) Priority Control: The CCTV Control software shall limit access to designated system functions based on the operator's priority. Access privileges are established and maintained by the system administrator. The system shall support a minimum of 20 priority levels. The system functions that are subject to priority-level access are as follows:

- Security – The capability to add, remove, and modify user privileges. Only the highest priority users can access the security functions. A user with access to this function will be considered an administrator.

- Configuration Database – The capability to add, remove, and modify all CCTV system devices. Only the highest priority users can access these functions.
- Viewing Restrictions – The capability to suppress and restore the display of camera images to selected video display devices. Only the highest priority users can access the image suppression functions.
- Video Routing Override – The capability to take control of locked communication resources and locked video monitors from an operator who has been assigned a lower priority level for this function.
- Camera Control Override – The capability to take control of a camera from an operator who has been assigned a lower priority level for this function.
- CCTV Connection Override – The capability to terminate a connection to a camera from an operator who has been assigned a lower priority level to free up a channel in order to establish a connection to a new camera in case all communication channels are being used. The system shall notify affected users of this action.
- Camera Video ID Text Override – The ability to add, remove, and override the ID text (i.e. location, name, and preset) written over the video image. Only the highest priority users can access the video overlay functions.

A user role shall determine the priority level assigned to a user for each of these system functions. The system administrator shall be able to add, remove, and modify user roles. Each defined user role shall be capable of supporting a unique combination of priority levels.

The system administrator shall be able to add and remove users. A user shall be identified by his or her CCTV GUI application login name. The system administrator shall be able to assign one of the previously defined roles to a new user.

e) Configuration Database Management: The configuration database shall utilize a COTS relational database management system (RDBMS) designed to handle multiple concurrent users.

Software configuration parameters shall be stored in the operating system's registry.

The system shall maintain a configuration database containing a list of communication resource devices including the device name and communication address. The communication resource management function shall read this database at startup to obtain the list of communication resource devices. It shall be possible for an operator with the appropriate priority level to add, remove, and modify a communication resource device without having to restart the communication resource management function.

The system shall maintain a configuration database containing a list of camera devices including the device name, communication address, and camera protocol. The camera control management function shall read this database at startup to obtain the list of camera devices. It shall be possible for an operator to add, remove, and modify a camera device without having to restart the camera control management function.

The system shall maintain a configuration database containing a list of video display devices including the device name, IP Address and TMC video switch (and 4-channel video multiplexer) input/output identifier. The video display control management function shall read this database at startup to obtain a list of available devices. It shall be possible for an operator to add, remove, and modify a video display device without having to restart the video display control management function.

The system shall maintain a configuration database of priority levels with assigned privileges, and users with assigned priority levels.

f) Health Monitoring Management: The health monitoring management shall provide functions identified in Deliverable 3F to monitor the health of the new prototype system including all existing and new TMC and field components.

Measurements and Payments:

All CCTV control server hardware and software shall be measured as a lump sum unit for each CCTV Control Server items of work identified below furnished, installed, configured and tested as a fully functional and integrated system component. Payment shall be considered full compensation for all associated hardware, software, accessories, integration and configuration services, materials and labor required.

ITEM C.1.1 - CCTV Control Server Hardware: Server and associated components with 19 inch equipment rack mountable provisions including a CD/DVD read/write drive, a tape back-up drive, a hard drive RAID, redundant network interface cards, redundant power supplies, a monitor, a keyboard, a mouse, and all necessary off-the-shelf software and accessories.

ITEM C.1.2 - CCTV Control Server Base Application System: CCTV control server base application software that provides all requirements identified in Section C.1 with the exception of the following specific items of work (C.1.3, C.1.4, C.1.5 and C.5.6).

ITEM C.1.3 - CCTV Control Server Viewing Restrictions Application Option: CCTV control server viewing restrictions application option that provides for all requirements identified in Section C.1, c), 1.

ITEM C.1.4 - CCTV Control Server Digital Cross Connect Management Application Option: CCTV control server digital cross connect management application option that provides for all requirements identified in Section C.1, a), 1.

ITEM C.1.5 - CCTV Control Server TMC Video Switch Control Management Application Option: CCTV control server TMC video switch control management application option that provides for all requirements identified in Section C.1, c), 3.

ITEM C.1.6 - CCTV Control Server Hub Video Switch Control Management Application Option: CCTV control server hub video switch control management application option that provides for all requirements identified in Section C.1, c), 4.

ITEM C.1.7 - Health Monitoring Management System Option: CCTV control server health monitoring management system option that provides for all requirements identified in Section C.1, f).

C.2 Workstation Graphical User Interface Applications

The System Integrator shall provide a standalone CCTV GUI application that fully functions on a workstation that does not have the ATMS software; as well as, a standalone CCTV GUI application web site running on the intranet web server. (Note that the CCTV GUI application shall also operate on a workstation concurrently running the ATMS software, to ensure there are no configuration management problems running both software applications simultaneously; however, integration of the CCTV GUI into the ATMS will occur in Phase 2.) The System Integrator can port over a CCTV GUI application software package that has been developed for a similar system in a different jurisdiction, develop the CCTV GUI application from scratch, or propose a different alternative not identified above.

The GUI application software packages shall provide for video display windows for viewing a minimum of four (4) video streams in a quad view as well as providing the ability to adjust display window sizes and the display contrast, brightness, etc.

The GUI application software packages shall display the streaming video images on the operator's computer monitor when that operator requests a connection to a camera. The GUI application software packages shall provide a single and integrated camera interface for the operators. The GUI application software packages shall utilize standard Windows™ user interface components including but not limited to menus, buttons, and hot keys. The GUI application software packages shall provide an intuitive approach allowing the operator to accomplish tasks without having to understand the underlying details of the communications network. The major functions of the GUI application software packages include the following:

- Activation/deactivation of CCTV camera controls and video streaming identified by icon selection on graphical map and by a searchable drop down menu;

- Automatic activation of the video stream display window with the video image of a specific camera location identified by icon selection on graphical map and by a searchable drop down menu;
- Video display device selection and automated activation of multicast video streaming channels for requested video streams;
- Camera control devices selection via camera location icons and drop down menus;
- Administrator Functions–Configure/Security;
- Operator feedback on CCTV location and system status (i.e. a message window stating "Selected camera in use by [insert user] with higher priority level" and by the icon on the map changing color or flashing); and
- Viewing restrictions selection.

A user with a higher priority control level shall be able to terminate any connection to a camera, display device, and communications resource for freeing-up and taking control of the CCTV system when required. In the event that a user with a higher priority control level affects the ability for the a lower level operator to continue a function, a message box shall automatically be sent to the lower priority level operator indicating what has just occurred and the name of the higher priority user.

a) Video Routing Interface Functions: The GUI application software packages shall provide a system screen that displays a geographic map indicating the locations of all CCTV devices. The map shall be resizable and support all CCTV control operations. The GUI application software packages shall also have the capability of displaying and selecting devices via a searchable drop down menu. The map shall support the display of camera icons based on the current zoom level. As a result, icons for cameras that are closely located geographically shall not be active until the map is at a zoom level that clearly identifies individual camera icons; however, the GUI application software packages shall provide the operator the ability to visually see the locations where groups of camera icons exist for the purpose of zoom level display. Thus, cameras that are widely distributed geographically will be in a different group than cameras that are closely distributed.

The GUI application software packages shall provide a video display screen containing a graphical representation of video display devices that visually indicates the physical location and relative position of the video display monitors. The display shall indicate any monitor that is currently locked and the user who has it locked. The GUI application software packages shall allow the operator to right click on a camera icon on a geographic map and give information about that particular camera location (i.e. county, route, on/off ramp location, ISDN phone number or IP address, status of camera—viewing availability, camera control availability, requiring maintenance, etc.)

The GUI application software packages shall allow the operator to drag a camera icon from the map and drop it on the image of any unlocked video display and the GUI application software packages shall allow the operator to double-click (or right click) on

an icon and select a video display from a drop-down menu. Alternatively, the GUI application software packages shall allow the operator to right-click on the image of any unlocked video display and select a camera from a drop-down list. In either case, the action shall cause the GUI application software packages to send commands to the CCTV Control Server to establish a connection to the selected camera; start multicasting the incoming compressed, digitized, and encoded video from the selected camera; route the image to the initiating client; and (if desired) route the image to an alternate selected display device. Upon successful completion of the video routing operation, any shared communication resources used for the connection and the selected video display shall be locked. Shared communication resources include the following:

- 14 ADN channels going through the TMC CSU/DSU devices;
- 2 ADN channels going through the TMC router;
- 14 ISDN channels going through the TMC ISDN TA devices;
- 2 ISDN dial-up ports on TMC router and;
- 3 SONET based Ethernet WAN channels going through the IP-encoders at the Walnut Creek hub.

In the event that shared communications resources are not available to route a camera image to the display device, the GUI application software packages shall display a message indicating the resource that is unavailable.

b) CCTV Control Interface Functions: The GUI application software packages shall support all of the required CCTV camera control functions through a graphical control panel. The CCTV controls shall be depicted by icons on the CCTV control panel. The control panel shall visually indicate and prevent the use of control functions not supported by the selected CCTV device. At the time an operator selects a camera to control, the video from that camera shall automatically be routed via the Video Distribution Server to that operator's monitor.

Upon successful completion of the video routing operation, any shared communication resources used for the connection and the associated video display shall be locked. If shared communication resources are not available to connect the camera to the TMC, the GUI application software packages shall display a message box indicating the resource that is not available. In the event the camera is currently being controlled by another operator, the GUI application software packages shall display a message box indicating the user that has control of the camera. At the time the CCTV control function is closed, user inactivity is detected, or another camera is selected, all locked resources shall be released automatically.

c) Camera and Display Device Status Function: The GUI application software packages shall provide a report screen containing information that indicates the status of all video cameras, communication resources, and display devices in the system. The information on the report shall be automatically updated once every 15 seconds. The GUI application software packages shall provide the following information:

- The camera, communications resource, or display device name
- The lock status of the device
- The name of the user who activated the lock
- The active cameras and displays
- The users of the active cameras and displays
- Any shared communication resource associated with the CCTV connection

The GUI application software packages shall provide an option on this report to release a locked camera, display, and any associated locked communication resources by an operator assigned a higher priority level than the user who established the locks. Upon release of the lock, the GUI application software packages shall send commands to the CCTV Control Server to release locks associated with the selected CCTV devices.

The GUI application software packages shall also keep a log of user activity with the following info:

- Time stamps of activated/deactivated cameras
- Other useful information to better manage the system.

d) Viewing Restrictions Interface Function: The GUI application software packages shall provide a viewing restrictions display window that allows an operator to suppress the display of designated camera images to selected video display devices. The viewing restrictions window shall provide a list of all CCTV cameras and a list of all video display devices. These lists of devices shall be displayed in the viewing restrictions window with the current status of each device in the list. The status of cameras shall be either available or suppressed. The status of each display device shall be restricted or unrestricted. The CCTV Control Server shall prevent the display of any suppressed camera on any restricted display device. The operator shall be able to change the status of either a camera or display device. This display shall be updated every 15 seconds to reflect any changes made by other operators. A user with a high priority control level shall be able to override viewing restrictions set by an operator of lower priority.

e) Device Configuration Interface Functions: The GUI application software packages shall provide device configuration interface screens that allow an operator (Administrator) to add, delete, or modify any CCTV system device. The information related to the device shall include a 40-character name, Lat/Long, control address information (e.g. IP address, cross connect channel, or ISDN phone number), Operational Status (e.g. Out of order, Operational, Construction, etc.) and device type (i.e. make and model). Only devices classified as "Operational" by the Administrator can be accessed and/or viewed an Operator. The information shall be sufficient to allow the device configuration interface to control and maintain the configuration of all devices in the CCTV system.

At the time changes to the CCTV system configuration are saved, the CCTV Control Server shall be automatically updated to reflect the changes.

f) CCTV System Administration Interface Function: The GUI application software packages CCTV system administration interface shall allow administrators to add users to the system and assign a role to each user of the system by associating the role name with the user's ID. The GUI application software packages shall support the process of establishing user access privileges including the creation of user roles. Each role shall consist of a 40-character user-defined reference name (e.g. Operator, Administrator) and the assignment of a priority level. There shall be a minimum of 20 priority levels. Each priority level shall have the ability to be assigned specific functions. The priority levels shall include a High, Medium, and Low level to each of the following major system functions:

- Security;
- Configuration Database;
- Viewing Restrictions;
- Video Routing; and
- Camera Control.

The GUI application software packages CCTV system administration interface shall allow operators with high priority access to security functions (Administrator) to create, remove, and edit user roles.

The GUI application software package shall be able to function as a standalone system without the ATMS map in the event of an ATMS application software failure.

Measurements and Payments:

All GUI application software packages shall be measured as a lump sum unit for each GUI Application items of work identified below furnished, installed, configured and tested as a fully functional and integrated system component. Payment shall be considered full compensation for all associated software, accessories, integration and configuration services, materials and labor required.

ITEM C.2.1 - Base GUI Application Package: GUI base application software that provides all requirements identified in Section C.2 with the exception of the intranet web server GUI application and the following specific items of work (C.2.2 and C.2.3).

ITEM C.2.2 - GUI Application Viewing Restrictions Application Option: GUI viewing restrictions application option that provides for all requirements identified in Section C.2, d).

C.3 Intranet Web Server

Remote monitoring and control of the Phase I CCTV prototype system shall be made available to project stakeholder users through the intranet web server and shall be capable of supporting a minimum of 100 simultaneous users.. The intranet web server shall be capable of supporting a minimum of 100 simultaneous users. The web site interfaces to the prototype system shall be via the GUI web server application hosted on the web server. Multiple types of standard off-the-shelf web browsers on the user's systems will be used to access the Phase I CCTV prototype system web server application software.

The Phase I CCTV prototype system intranet web site shall provide GUI that can be used by individuals with minimal experience to formulate their data and video retrieval requests. The intranet web server application package intended for implementation with the CCTV GUI shall be procured from available off-the-shelf application packages. The software implementation effort for the web server application package shall consist of configuring the procured product to work with CCTV GUI in the manner specified herein.

The intranet web server shall allow a remote system user to perform all operator and administrator functions identified in Section C.2 - Workstation Graphical User Interface Applications through a Virtual Private Network (VPN) connection to the internet; as well as, through a direct intranet connection off the CCTV LAN using Hyper Text Markup Language (HTML), Extensible Markup Language (XML), or an approved equivalent. The web server shall accept requests from browsers including Netscape and Internet Explorer and then return the appropriate HTML/XML data. The web server shall operate on a Windows™ Server operating system. The web server will require configuration to support server side scripting such as CGI scripts, server-side include scripts, SSL security, VPN authentication, and Active Server Pages (ASPs). Server-side technologies shall be used as necessary to increase the power of the server beyond its ability to deliver standard HTML pages to meet all functional requirements.

Access to the intranet web server and the degree of system functionality will be based on the authentication of the user account and user account privileges defined by the System Administrator per Section C.1 – CCTV Control Server. As with the workstation GUI application, intranet web server user's accounts shall be assigned priority levels and privileges, which may restrict access to resources and functions per Sections C.1.a. – Communications Resource Management, C.1.b. – Camera Control Management, C.1.c. – Video Display Control Management, C.1.d. – Priority Control, and C.1.e. – Configuration Database Management.

The intranet web server shall run server side scripts to process the user request, connect to the CCTV server, authenticate user, determine priority level and access privileges, and perform the user desired functions if within the rights assigned to the user account. As with the workstation GUI applications, the web server CCTV GUI application shall

facilitate launching of multiple simultaneous video media player windows to view the selected CCTV images being sent to the remote users from the VDS.

As depicted in Figure 1, the prototype CCTV system intranet web server shall be connected to the Internet via the network switch, firewall, and T1 router. The network switch shall provide Intranet users currently on the CCTV LAN with direct access to the web server; as well as, provide connectivity between the web server and the firewall/router for intranet users obtaining access via the internet. The general public shall not be allowed access to the web server CCTV GUI application. Only stakeholder staff with access permission shall be allowed internet access to the web server, using an intranet VPN connection through the firewall. The T1 router shall provide the bridging function between the leased T1 line to the internet service provider (ISP) and the Ethernet link to the firewall. See Section A.2 - Communications Network Elements for the functional requirements of the firewall and T1 router.

Measurements and Payments:

All intranet web server hardware and software shall be measured as a lump sum unit for each Intranet Web Server items of work identified below furnished, installed, configured and tested as a fully functional and integrated system component. Payment shall be considered full compensation for all associated hardware, software, accessories, integration and configuration services, materials and labor required.

ITEM C.3.1 - Intranet Web Server Hardware: Server and associated components with 19 inch equipment rack mountable provisions including a CD read/write drive, redundant network interface cards, a monitor, a keyboard, a mouse, and all necessary off-the-shelf software and accessories.

ITEM C.3.2 - Intranet Web Server GUI Application Package: Intranet web server base application software that provides all functional requirements identified in Sections C.2 and C.3.

This page left blank intentionally.

APPENDIX B, Phase I, Summary Task Budget and Equipment Price List

Section V.H.1 (a) of the RFP requires all prospective System Integrators to submit a task budget that encompasses and breaks down all prototype system costs in connection with the Project. MTC SAFE is not providing a standard format for the detailed task budget. However, all prospective System Integrators must complete, sign and include in their proposal the following Summary Task Budget and Equipment Price List for Phase I (Table 1 and Table 2). Tables 1 and 2 may also be used to provide the cost estimate for Phase II required in Section V.H.2 of the RFP.

The Summary Task Budget is not intended to provide sufficient detail for the detailed task budget requested in Section V.H.1(a) of the RFP.

Table 1 – Project Oversight and Associated Technical Support

Item #	Phase I Part & Task No.	Milestone or Deliverable	Subtask Lump Sum Price	Task Subtotal
	IA.	**Prototype Design & Lab Demonstration**		
	Task 1	Project Kickoff, Scope Revisions and Schedule Deliverables: 1A 1-6		
1.	Del. 1A-1	Draft summary of all issues and action items	$	
2.	Del. 1A-2	Final summary of all issues and action items	$	
3.	Del. 1A-3	Draft revised project scope and cost proposal	$	
4.	Del. 1A-4	Final revised project scope and cost proposal	$	
5.	Del. 1A-5	Draft project schedule developed on Microsoft Project	$	
6.	Del. 1A-6	Final project schedule developed on Microsoft Project	$	
7.		**Task 1 Subtotal:**		$
	Task 2	Video Encoder/Decoder Pre-evaluation Test Bed Deliverables: 2A 1-6		
8.	Del, 2A-1	Draft list of ten video encoder /decoder devices	$	
9.	Del. 2A-2	Final list of ten video encoder /decoder devices	$	
10.	Del. 2A-3	Draft report, test bed configuration, test procedures, evaluation criteria.	$	
11.	Del. 2A-4	Final report, test bed configuration, test procedures, evaluation criteria	$	
12.	Del. 2A-5	Draft summary report of test results	$	
13.	Del. 2A-6	Final summary report of test results	$	
14.		**Task 2 Subtotal:**		$

Item #	Phase I Part & Task No.	Milestone or Deliverable	Subtask Lump Sum Price	Task Subtotal
	Task 3	Engineering Services and Documentation Deliverables: 3A 1-9		
15.	Del. 3A-1	Complete set of hardware & software documentations	$	
16.	Del. 3A-2	Complete set of as built documentation	$	
17.	Del. 3A-3	Five draft copies of documentation to install/operate GUI	$	
18.	Del. 3A-4	Five final copies of documentation to install/operate GUI	$	
19.	Del. 3A-5	Draft set of training class documentation	$	
20.	Del. 3A-6	Twenty-five final sets of training class documentation	$	
21.	Del. 3A-7	Warranty documentation	$	
22.		**Task 3 Subtotal:**		$
	Task 4	Equipment, Software Procurement, Develop, Deliver, Install, Configure & Integrate-Deliverables: 4A 1-8		
23.	Del. 4A-1	CD with software lab demonstration applications	$	
24.	Del. 4A-2	Draft summary report documenting comments	$	
25.	Del. 4A-3	Final summary report documenting comments	$	
26.	Del. 4A-4	Complete, fully functional CCTV prototype system	$	
27.	Del. 4A-5	Detailed software design review documentation	$	
28.	Del. 4A-6	Two sets of CCTV server, standalone software	$	
29.	Del. 4A-7	Two sets of server, standalone software source code	$	
30.	Del. 4A-8	All software licenses	$	
31.		**Task 4 Subtotal:**		$
	IB.	**Prototype Field Integration**		
	Task 5	Prototype Field Integration, Deliverables: 5B 1-13		
32.	Del. 5B1	CD with updated software applications	$	
33.	Del. 5B-2	Draft summary report documenting the courses of action resulting from lab demonstration	$	
34.	Del. 5B-3	Final summary report documenting the courses of action resulting from lab demonstration	$	
35.	Del. 5B-4	Draft Acceptance Test Procedures	$	
36.	Del. 5B-5	Final Acceptance Test Procedures	$	
37.	Del. 5B-6	Complete fully functional CCTV prototype	$	

38.	Del. 5B-7	Detailed updated Software Design Review documentation	$	
39.	Del. 5B-8	Two sets of CCTV server, standalone software	$	
40.	Del. 5B-9	Two sets of CCTV server, standalone software source code	$	
41.	Del. 5B-10	All software licenses	$	
42.	Del. 5B-11	Draft summary report of Acceptance Test results	$	
43.	Del. 5B-12	Final summary report of Acceptance Test results	$	
44.	Del. 5B-13	Summary report of operational test results	$	
45.		**Task 5 Subtotal:**		$
	IC.	**Full Prototype Interoperability**		
	Task 6	Full Prototype Interoperability with all field CCTVs Deliverables: 6C 1-2		
46.	Del. 6C-1	Fully installed, integrated deployed prototype	$	
47.	Del. 6C-2	Summary report documenting CCTV operator comments	$	
48.		**Task 6 Subtotal:**		$
	Task 7	Full Prototype Acceptance Testing Deliverables: 7C 1-14		
49.	Del. 7C-1	Draft electronic copy of acceptance test procedures	$	
50.	Del. 7C-2	Final electronic copy of acceptance test procedures	$	
51.	Del. 7C-3	Draft summary report of acceptance test results	$	
52.	Del. 7C-4	Final summary report of acceptance test results	$	
53.	Del. 7C-5	Draft summary report of operational test results	$	
54.	Del. 7C-6	Final summary report of operational test results	$	
55.	Del. 7C-7	CD with final software applications	$	
56.	Del. 7C-8	Draft summary report documenting courses of action	$	
57.	Del. 7C-9	Final summary report documenting courses of action	$	
58.	Del. 7C-10	Complete, fully functional CCTV prototype system	$	
59.	Del. 7C-11	Detailed final Software Design Review documentation	$	
60.	Del. 7C-12	Two sets of CCTV server, standalone software	$	
61.	Del. 7C-13	Two sets of CCTV server, standalone software source code	$	
62.	Del. 7C-14	All software licenses	$	
63.		**Task 7 Subtotal:**		

Item #	Phase I Part & Task No.	Milestone or Deliverable	Subtask Lump Sum Price	Task Subtotal
64.	Task 8	Operational Support (Three Years)		$
	ID.	**Phase II Deployment Plan**		
	Task 9	Develop Phase II Deployment Plan Deliverables: 9D 1-2		
65.	Del.9D-1	Draft Phase II Deployment Plan		
66.	Del. 9D-2	Final Phase II Deployment Plan		
67.		**Task 9 Subtotal:**		$
68.		**Total Project Budget Excluding Equipment:**		$

Table 2 – Hardware and Software Item Price Schedule

Item #	Ref. #	Item	Unit	Unit Cost	QTY	Cost
1.	A.2.1	Video Distribution Server (VDS)	Each		1	
2.	A.2.2	IP-Video Encoders (Qty reflects total # of video signals to be encoded)	Each		38	
3.	A.2.3	IP-Video Decoders (Qty reflects total # of video signals to be decoded)	Each		4	
4.	A.2.4	Digital Cross Connect	Each		1	
5.	A.2.7	Ethernet Terminal Server (16 Port)	Each		6	
6.	A.2.10	Ethernet Network Switch (Including all associated software)	Each		1	
7.	A.2.11	TMC Router (Including all associated software)	Each		1	
8.	A.2.13	Router 56k DSU	Each		2	
9.	A.2.14	ISDN Router	Each		3	
10.	A.2.15	Internet Firewall	Each		1	
11.	A.2.16	Internet T1 Router	Each		1	
12.	B.1.1	CCTV Camera Assemblies	Each		3	
13.	C.1.1	CCTV Control Server Hardware	Each		1	
14.	C.1.2	CCTV Control Server Base Application System	LS		1	
15.	C.1.3	CCTV Control Server Viewing Restrictions Application Option	LS		1	
16.	C.1.4	CCTV Control Server Digital Cross Connect Management Application Option	LS		1	
17.	C.1.5	CCTV Control Server TMC Video Switch Control Management Application Option	LS		1	
18.	C.1.6	CCTV Control Server Hub Video Switch Control Management Application Option	LS		1	
19.	C.1.7	Health Monitoring Management System Option	LS		1	
20.	C.2.1	GUI Base Application System	LS		1	
21.	C.2.2	GUI Application Viewing Restrictions Application Option	LS		1	
22.		Should this be deleted?				
23.	C.3.1	Intranet Web Server Hardware	LS		1	
24.	C.3.2	Intranet Web Server GUI Application Package	LS		1	
25.						
26.						
27.						
28.		**Total:**				

All of the items in the above table are collectively referred to as “the equipment purchase”, including the software license fees.

The quantities specified in Table 2 are for evaluation purposes only. MTC SAFE may choose to modify such quantities and/or eliminate equipment through its issuance of a Request for Best and Final Offer or, by Change Order, after the System Integrator is selected.

Although recurring software license fees are not desired, the System Integrator shall disclose any such recurring costs in this proposal. Any such recurring costs will be added to the cost proposal total based on a 20-year period of use when evaluating perspective System Integrators. Lines 25-27 of Table 2 are intended to allow the Proposer to include any other equipment or software costs.

DATE

(SIGNATURE OF AUTHORIZED OFFICIAL)

(TYPE OR WRITE APPROPRIATE NAME, TITLE)

(TYPE OR WRITE NAME OF COMPANY)

APPENDIX C – Phase II, Scope Of Work

(Full System Build-out)

The Phase II, CCTV Prototype System services to be performed by System Integrator shall consist of services requested by the MTC SAFE through one of its designated representatives (the Caltrans Project Manager or the MTC SAFE Contract Manager) including, but not limited to, Project Oversight and Associated Technical Services and Equipment Purchase.

A. Project Description

The CCTV Working Group comprised of representatives from MTC, Caltrans District 4, and CHP has identified Phase II to include the full integration of the Phase I CCTV System to the Caltrans District 4 ATMS and the full District wide build-out of the CCTV system deployed in Phase I. The major objectives of Phase II is to provide the full functionality of the Phase I CCTV system from the ATMS operator interface and to upgrade or replace and activate another approximately 380 video camera locations using the IP communications approach selected in Phase I.

As depicted in **Figure C1**, it is currently anticipated that Phase II will include furnishing and installing backup servers for the CCTV and Internet servers installed in Phase I. This task will include making the necessary modifications to the software developed in Phase I to accommodate the backup servers. Phase II also includes furnishing and installing a backup video distribution server and necessary software to provide load sharing for the additional CCTV cameras.

Phase II includes replacing the codecs and routers to bring the additional video cameras onto the IP communications network. Some CCTV cameras may also need to be replaced in Phase II. The existing analog video switch will be removed.

Phase II includes adding a NTCIP Center-to-Center communications module to the new IP-based control and routing platform that will facilitate the sharing of CCTV video for viewing and control between Caltrans District 4 and their regional partners. In Phase II, the System Integrator shall implement the national standard options specified in the Phase II Deployment Plan (Task 9).. This deals primarily with the ITE/AASHTO Traffic Management Data Dictionary and Message Set (TMDD) standard, due out later this year. TMDD deals with sharing of CCTV camera and video switch status and control.

Phase II includes adding a NTCIP Center-to-Field communications module to the new IP-based control and routing platform that will facilitate communications with five new NTCIP protocol compatible camera assemblies. The System Integrator shall implement the stardards (NTCIP 1205, 1208, and 1212)specified in the Phase II Deployment Plan (Task 9).
Any software options described in Phase I that are not exercised, may be added to the system as part of the Phase II tasks.

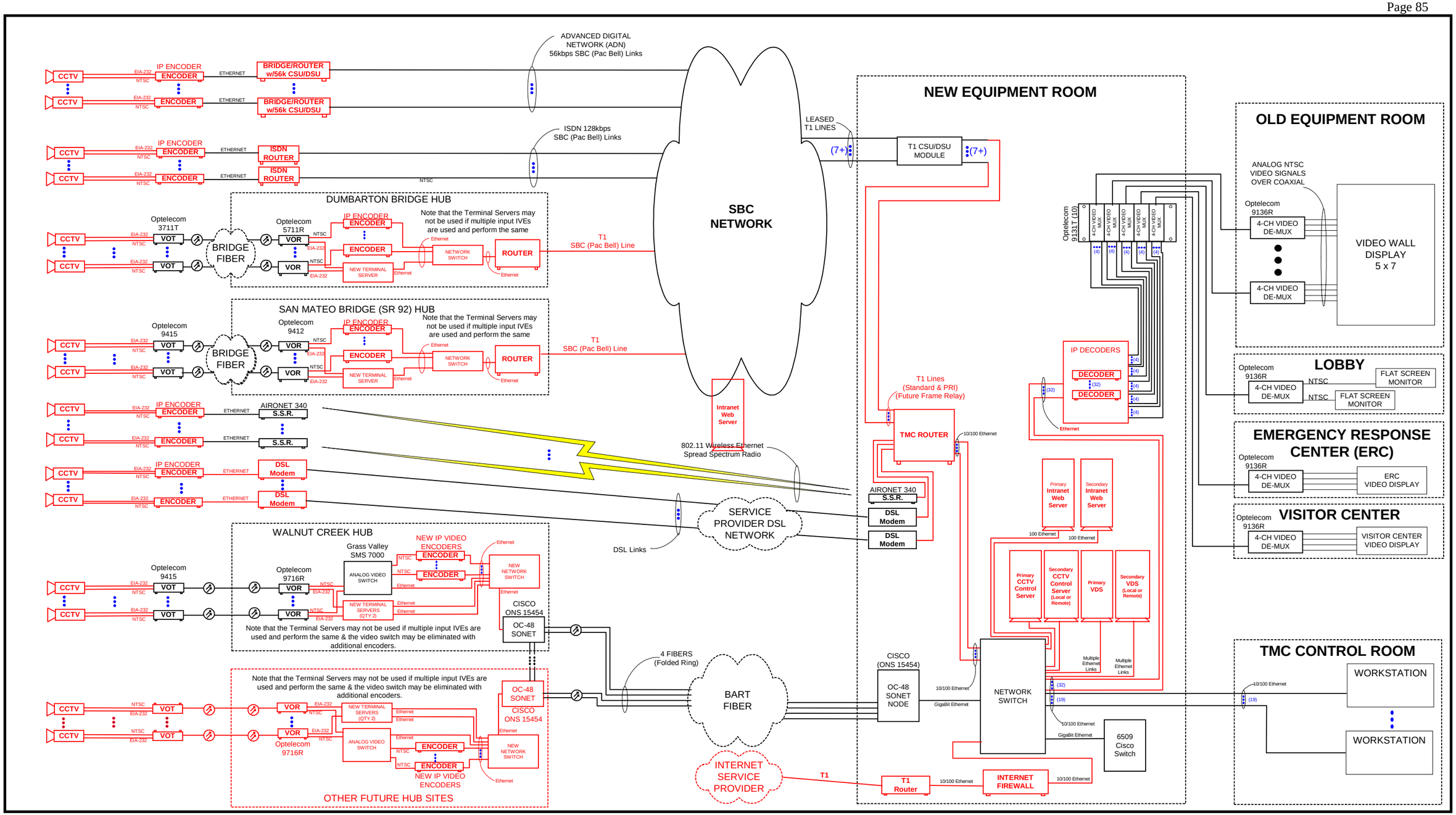

Figure C1 – Future CCTV System Full Build-Out Block Diagram

APPENDIX D - List Of Acronyms

ADN	Advanced Digital Network
API	Application Programmer's Interface
ATMS	Advanced Transportation Management System
BART	Bay Area Rapid Transit
BRI	Basic Rate Interface
CCTV	Closed-Circuit Television
CCP	Camera Control Panel
CCU	Camera Control Unit
CHP	California Highway Patrol
CODEC	Encoder/Decoder
COTS	Commercial-Of-Te-Self
CSU/DSU	Channel Service Unit/Data Service Unit
DSS	Digital Satellite Services
DTS	Dynamic Technology Systems
DVD	Digital Video Disk
EPROM	Erasable Programmable Read-Only Memory
ERC	Emergency Response Center
FEP	Front End Processor
fps	frames per second
GUI	Graphical User Interface
HDTV	High Definition Television
HW	Hardware
IMS	Intelligent Management System
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISO	International Standards Organization
ITMS	Intelligent Traffic Management System
ITU	International Telecommunication Union
LAN	Local Area Network
MAN	Metropolitan Area Network
MCCP	Master Camera Control Panel
MCPU	Master Central Processor Unit
MMS	Multicast Management Server
MPC	Microprocessor Control
MPEG	Motion Pictures Experts Group
NTCIP	National Transportation Communications for ITS Protocol
POTS	Plain Old Telephone Service
PRI	Primary Rate Interface
PSTN	Public Switched Telephone Network
PTZ	Pan-Tilt-Zoom
STV	Standard Television
SW	Software

TMC	Traffic Management Center
VDS	Video Distribution Server
VME	VERSAmodule Eurocard bus
VNCI	Video Networks Communications, Inc.
WAN	Wide Area Network

APPENDIX E - Cost And Price Analysis Form

PHASES I AND II

COST AND PRICE ANALYSIS - RESEARCH AND DEVELOPMENT CONTRACTS				
This form is to be used in lieu of FAA Form 3515 as provided under FAPR 2-16.260-2, it will be executed and submitted with proposals in response to "Requests for Proposals," for procurement of research and development services. If your cost accounting system does not permit analysis of costs as required, contact the purchasing office for further instructions.			PURCHASE REQUEST NUMBER	
NAME AND ADDRESS OF OFFERER	TITLE OF PROJECT			
DETAIL DESCRIPTION		ESTIMATED HOURS	RATE/HOUR	TOTAL ESTIMATED COST (Dollars)
1. DIRECT LABOR(Specify)				
TOTAL DIRECT LABOR				
2. BURDEN (Overhead-specify) Dept. or Cost Center	Burden Rate	X BASE	BURDEN ($)	
TOTAL BURDEN				
3. DIRECT MATERIAL				
TOTAL MATERIAL				
4. SPECIAL TESTING (Including field work at Government installations)				
TOTAL SPECIAL TESTING				
5. SPECIAL EQUIPMENT (If direct charge - specify in Exhibit B on reverse				
6. TRAVEL (If direct charge)				
a. TRANSPORTATION				
b. PER DIEM OR SUBSISTENCE				
TOTAL TRAVEL				
7. CONTRACTORS (Identify - purpose - rate)				
TOTAL CONTRACTORS				
8. SUBCONTRACTORS (Specify in Exhibit A on reverse)				
9. OTHER DIRECT COSTS (Specify in Exhibit B on reverse - explain royalty costs, if any)				
10. TOTAL DIRECT COST AND BURDEN				
11. GENERAL AND ADMINISTRATIVE EXPENSE (Rate % of item nos.)				
12. TOTAL ESTIMATED COST				
13. FIXED FEE OR PROFIT (State basis for amount in proposal)				
14. TOTAL ESTIMATED COST AND FIXED FEE OR PROFIT				

15. OVERHEAD RATE AND GENERAL AND ADMINISTRATIVE RATE INFORMATION				
A. GOVERNMENT AUDIT PERFORMED	DATE OF AUDIT	ACCOUNTING PERIOD COVERED		
B. NAME AND ADDRESS OF GOVERNMENT AGENCY MAKING AUDIT		C. DO YOUR CONTRACTS PROVIDE NEGOTIATED OVERHEAD RATES? ( ) NO ( ) YES *(IF YES, NAME AGENCY NEGOTIATING RATES)*		
D. (If no Government rates have been established, furnish the following information)				
DEPARTMENT OR COST CENTER	RATE	TOTAL INDIRECT EXPENSE POOL		BASE FOR TOTAL

16. EXHIBIT A - SUBCONTRACT COSTS (If more space needed, use blank sheets, identify item number)			
NAME AND ADDRESS OF SUBCONTRACTOR(S)	SUBCONTRACTED WORK	SUBCONTRACT	
		TYPE	AMOUNT
TOTAL			

17. EXHIBIT B - OTHER DIRECT COSTS (If more space needed, use blank sheets, identify item number)	
TOTAL	

CERTIFICATE

The labor rates and the overhead costs are current and other estimated costs have been determined by generally accepted accounting principles. Bidder represents: (a) that he__has, __has not, employed or retained any company or person (other than a full-time bona fide employee working solely for the bidder) to solicit or secure his contract, and (b) that he__has, __has not, paid or agreed to pay to any company or person (other than a full-time bona fide employee working solely for the bidder) any fee, commission, percentage or brokerage fee, contingent upon or resulting from the award of this contract, and agrees to furnish information relatin to (a) and (b) above, as requested by the Contracting Officer.

For interpretation of the representation including the term "bona fide employee," see Code of Federal Regulations, Title 44, Part 150.

NO. OF CONTRACTOR EMPLOYEES:	STATE INCORPORATED IN:
[ ] 500 AND UNDER [ ] OVER 500 [ ] OVER 750 [ ] OVER 1,000	

DATE	SIGNATURE AND TITLE OF AUTHORIZED REPRESENTATIVE OF CONTRACTOR

APPENDIX F - California Levine Act Statement

California Government Code § 84308, commonly referred to as the "Levine Act," precludes an officer of a local government agency from participating in the award of a contract if he or she receives any political contributions totaling more than $250 in the 12 months preceding the pendency of the contract award, and for three months following the final decision, from the person or company awarded the contract. This prohibition applies to contributions to the officer, or received by the officer on behalf of any other officer, or on behalf of any candidate for office or on behalf of any committee.

MTC SAFE's commissioners include:

Tom Ammiano
Tom Azumbrado
James T. Beall, Jr.
Irma L. Anderson
Mark DeSaulnier
Bill Dodd
Dorene M. Giacopini
Scott Haggerty
Barbara Kaufman
Steve Kinsey
Sue Lempert
John McLemore
Michael D. Nevin
Jon Rubin
Bijan Sartipi
James P. Spering
Pamela Torliatt
Sharon Wright
Shelia Young

1. Have you or your company, or any agent on behalf of you or your company, made any political contributions of more than $250 to any MTC SAFE commissioner in the 12 months preceding the date of the issuance of this request for qualifications?

   ___ YES ___ NO
   If yes, please identify the commissioner: _____

2. Do you or your company, or any agency on behalf of you or your company, anticipate or plan to make any political contributions of more than $250 to any MTC SAFE commissioners in the three months following the award of the contract?

   ___ YES ___ NO
   If yes, please identify the commissioner: _____

Answering yes to either of the two questions above does not preclude MTC SAFE from awarding a contract to your firm. It does, however, preclude the identified commissioner(s) from participating in the contract award process for this contract.

_____ _____
DATE (SIGNATURE OF AUTHORIZED OFFICIAL)

_____
(TYPE OR WRITE APPROPRIATE NAME, TITLE)

_____
(TYPE OR WRITE NAME OF COMPANY)

APPENDIX G – Warranties, Indemnification and Risk of Loss

This Appendix provides cross-references between contract provisions included in the Industry Review Draft RFP and the Contract Terms and Conditions in Appendix H to this RFP.

1. Warranties

a. Warranty Term

.

[See Article 9.1 of *Appendix H*, Contract Terms and Conditions]

b. LIMITATION OF WARRANTY.

[See Article 9.7 of *Appendix H*, Contract Terms and Conditions.]

c. Hardware Warranty

[See Article 9.2 of *Appendix H*, Contract Terms and Conditions]

e. Software Warranty

[See Article 9.3 of *Appendix H*, Contract Terms and Conditions.]

f. Procedure for Asserting Warranty Rights

[See Article 9.4 of *Appendix H*, Contract Terms and Conditions.]

g. Title Warranty

[See Article 9.5 of *Appendix H*, Contract Terms and Conditions.]

h. Patent and Copyright Warranties

[See Article 9.6 of *Appendix H*, Contract Terms and Conditions.]

2. Indemnifications

a. General Indemnification

[See Article 11.3.1 of *Appendix H*, Contract Terms and Conditions.]

b. Patent and Copyright Indemnification

[See Article 11.3.2 of *Appendix H*, Contract Terms and Conditions.]

3. Risk of Loss

a. Passage of Title

[See Article 11.4.1 of *Appendix H*, Contract Terms and Conditions]

b. Risk of damage and loss

[See Article 11.4.2 and 11.4.3 of *Appendix H*, Contract Terms and Conditions]

4. Limitation of Liability

[See Article 11.6 of *Appendix H*, Contract Terms and Conditions]

5. Force Majeure

[See Article 11.1 of *Appendix H*, Contract Terms and Conditions]

APPENDIX H – Contract Terms & Conditions

Enclosed as separate document, incorporated herein by this reference.

Appendix I
Federal Department of Transportation Forms

The federal Department of Transportation requirements are included in *Appendix H*, Contract Terms and Conditions, Article 14.7. In addition, proposers are required to submit the following:

1. Debarment. In contracts over $100,000, Consultant is required to certify, prior to executing a contract, that neither it nor its principals have been debarred from certain federal transactions by any Federal agency and to require any subcontractors with subcontracts over $100,000 to provide a similar certification. (A copy of the required certification is included with this Appendix as I-1.)

2. Restrictions on Lobbying. In agreements over $100,000, Consultant is required to execute a certificate indicating that no federal funds will be used to lobby federal officials and to disclose lobbying activities financed with non-federal funds. (Certificate attached as I-2.)

3. Buy America

   Complete I-3, attached.

4. Subcontractor Information Form

   Complete I-4, attached.

Appendix I-1,CERTIFICATION REGARDING DEBARMENT

(Third Party Contracts and Subcontracts over $100,000)

CERTIFICATION REGARDING DEBARMENT, SUSPENSION,
INELIGIBILITY AND VOLUNTARY EXCLUSION
LOWER TIER COVERED TRANSACTION

(1) The prospective lower tier participant certifies, by submission of this bid or proposal, that neither it nor its "principals" [as defined at 49 C.F.R. Section 29.105(p)] is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) When the prospective lower tier participant is unable to certify to the statements in this certification, such prospective participant shall attach an explanation to this proposal.

_____ _____

Date (signature of authorized official)

_____

(type/print name and title)

Instructions for Certification:

1. By signing and submitting this bid or proposal, the prospective lower tier participant is providing the signed certification set out below.

2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, MTC may pursue available remedies, including suspension and/or debarment.

3. The prospective lower tier participant shall provide immediate written notice to MTC if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

4. The terms “covered transaction,” “debarred,” “suspended,” “ineligible,” “lower tier covered transaction,” “participant,” “persons,” “lower tier covered transaction,” “principal,” “proposal,” and “voluntarily excluded,” as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549 [49 CFR Part 29]. You may contact MTC for assistance in obtaining a copy of those regulations.

5. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized in writing by MTC .

6. The prospective lower tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List issued by U.S. General Service Administration.

8. Nothing contained in the foregoing shall be construed to require establishment of system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

9. Except for transactions authorized under Paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to all remedies available to the Federal Government, MTC may pursue available remedies including suspension and/or debarment.

Appendix I-2, Lobbying Certification

CERTIFICATION
OF
RESTRICTIONS ON LOBBYING

I, _____ hereby certify on behalf of _____ that:
(name and title of grantee official) (name of grantee)

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance is placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Executed this _____ day of _____, 2001.

By:

_____
(signature of authorized official)

_____
(title of authorized official)

Appendix I-3, Buy America Certification

49 U.S.C. § 5323(j) and 49 CFR Part 661

Note: This is the certification recommended by FTA. FHWA-funded equipment requires a modification of this clause by the Office of the General Counsel.

Buy America - The contractor must agree to comply with 49 U.S.C. 5323(j) and 49 CFR Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 CFR 661.7, and include final assembly in the United States for 15 passenger vans and 15 passenger wagons produced by Chrysler Corporation, microcomputer equipment, software, and small purchases (currently less than $100,000) made with capital, operating, or planning funds.

A bidder or offeror must submit to MTC the appropriate Buy America certification (below) with all bids on FTA-funded contracts, except those subject to a general waiver. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive. This requirement does not apply to lower tier subcontractors.

Certification requirement for procurement of steel, iron, or manufactured products.

Certificate of Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it will meet the requirements of 49 U.S.C. 5323(j)(1) and the applicable regulations in 49 CFR Part 661.

Date _____

Signature _____

Company Name _____

Title _____

(next page)

Certificate of Non-Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(1), but it may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(B) or (j)(2)(D) and the regulations in 49 CFR 661.7.

Date _____

Signature _____

Company Name _____

Title _____

APPENDIX I-4, Subcontractor Information Form

Name of Respondent:	**Project Description:**
Address:	**Project Manager:**
Address:	
Certified DBE Status: Yes _____ No: _____	

Firms Contacted as Potential Subcontractors (Include firms that initiated contact) (Name/Address/Contact/Phone)	If Certified DBE, certifying agency/date	Description of Firm's area of specialty.	Indicate if Firm initiated contact.
1.			
2.			
3.			

(Attach extra sheets as needed)

I CERTIFY that the information included on this Form is complete and true.

Name: _____ **Title:** _____

Signature _____ **Date:** _____

Appendix J-1, Questions regarding System Integrator CCTV Upgrade RFP

RFP Section	Question	Response
	1.	
	2.	
	3.	
	4.	
	5.	
	6.	
	7.	
	8.	
	9.	
	10.	
	11.	
	12.	

Appendix J-2, Requests for Revision or Exception

RFP Section	Relevant Provision	Requested Action
	1.	
	2.	
	3.	
	4.	
	5.	
	6.	
	7.	
	8.	
	9.	
	10.	
	11.	
	12.	

	13.	